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Mitchell et al., Mutat. Res. 70:91-105, 1980

Fedorka-Cray et al., National Antimicrobial susceptibility monitoring program - veterinary isolates, U.S. Gov. Printing Office, Washington D.C., 1998 April

Cohen et al., J. Bacteriol., 175:1484-1492, 1993

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FDA / USDA / CDC

See site at <http://www.arnu.saa.ars.usda.gov/narms-1997/narms97.html>

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FDA/USDA/CDC

National Antimicrobial Susceptibility Monitoring Program -
Veterinary Isolates

April, 1998

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INTRODUCTION

The emergence of resistance to antimicrobics has compromised control of many bacterial pathogens and is a global problem. Multiple resistance has emerged among many bacterial strains including *Salmonella* species. A penta-resistant strain of *Salmonella* DT104 in which the resistance genes have been chromosomally integrated is proving to be particularly problematic resulting in morbidity and mortality in both animals and humans.

The development of resistant human pathogenic bacteria may result from direct use of antimicrobial agents in humans and acquisition of resistant organisms or resistance factors from animal and environmental bacteria. The intestinal flora of animals exposed to antimicrobial agents can serve as a reservoir of resistant bacteria.

Because of the public health concerns associated with the use of antimicrobics in food-producing animals, an antimicrobial resistance program was proposed by the Food and Drug Administration Center for Veterinary Medicine (FDA) as a post-marketing activity to monitor the continued safety and efficacy of veterinary antimicrobics. In 1996, the CDC, the USDA, and the FDA established the National Susceptibility Monitoring System to prospectively monitor changes in antimicrobial susceptibilities of zoonotic pathogens from clinical specimens, from healthy farm animals, and from carcasses of food-producing animals at slaughter. Non-typhoid *Salmonella* as the sentinel organism.

Veterinary testing is conducted at USDA's Agricultural Research Service Russell Research Center in Athens, GA. Testing is done using an automated system (Sensititre™ Accumed, Westlake Ohio). This report summarizes the percentage of isolates collected during 1997 that were susceptible, intermediate, or resistant to 17 antimicrobics (n=2,391). The 17 antimicrobics were chosen to be the most common antimicrobics (or classes of antimicrobics) used in animal and human medicine. A subsequent report will summarize the minimum inhibitory concentrations obtained for these isolates and will provide a discussion of the data. Questions regarding this report should be directed to any of the people listed below.

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GOALS AND OBJECTIVES

The goals and objectives of the monitoring program are to:

- 1) provide descriptive data on the extent and temporal trends of antimicrobial susceptibility in *Salmonella* and other enteric org human and animal populations;
- 2) facilitate the identification of resistance in humans and animals as it arises;
- 3) provide timely information to veterinarians and physicians;
- 4) prolong the life span of approved drugs by promoting the prudent and judicious use of antimicrobics; and
- 5) identify areas for more detailed investigation.

Information resulting from the monitoring program and follow-up outbreak investigations will be distributed to veterinarians, ph animal producer groups. Use of the information will be targeted to redirecting drug use so as to diminish the development and resistance over the short term with directives involving long-term use developed in collaboration with the appropriate professio groups. Outbreak investigations and field studies will be initiated as a result of major shifts or changes in resistance patterns in human isolates.

METHODOLOGY

Isolation:

Salmonella isolates with known serotypes are struck onto 5% sheep blood agar (SBA) plates for isolation. Plates are incubate overnight. The following morning one well-isolated colony from each plate is picked and regrown on a second SBA plate which 37°C overnight.

Screening for resistance:

One sterile dd H₂O tube and 1 Mueller- Hinton broth (MHB) tube is set in a rack for each isolate. One substrate strip is added t minimum of 15 minutes prior to inoculation (Note: Once substrate strips are added to MHB tubes, they must be used within 1 h. Two to six colonies from the second SBA are collected with a sterile cotton tipped swab and used to inoculate the water tube. vortexed and the density is adjusted with the Nephelometer as per manufacturer's instructions (Note: the machine is calibrated standard prior to starting the procedure). A 10 ml disposable loop from Sensititre is used to transfer 10 ml from the inoculated tube containing the substrate strip. The MHB tube is vortexed and placed into the auto inoculator (typically one isolate per mic manufacturer's instructions. The microtiter plate is incubated at 37°C for 18 - 20 hours (Note: The time for reading plates is 18- plates are read as close to 18 hrs. as possible). Record the time the microtiter plate is inoculated and read on a sheet. Do NO keep data from plates >20 h old). (Note: Ideally plates should not be stacked while in the incubator. If stacking is required, sta plates high.)

Microtiter plates are read as per manufacturer's instructions

Freezing clones:

Using a sterile disposable 1 ml inoculating loop 6 colonies from the second SBA plate are picked and inoculated (by vigorous to dislodge bacteria) into 1 ml LB broth plus 30% glycerol in cryo vials. The vials are stored frozen at -70°C and labeled with the information:

Information	Example
SURVEY	AB CLONE
STUDY	FSIS 95
ISOLATE #	2345
DATE	2/26/96

TABLE OF ANTIMICROBICS

Antimicrobial	Antimicrobial Concentrations (ug/ml)*	Breakpoint		
		(R)	(I)	(S)
Amikacin	4 - 32	≥64	32	≤16
Amoxicillin/Clavulanic Acid	0.5/0.25 - 32/16	≥32	16	≤8
Ampicillin	2 - 64	≥32	16	≤8
Apramycin	2 - 16	≥32	16	≤8
Ceftiofur	0.5 - 16	≥8	4	≤2
Ceftriaxone	0.25 - 16	≥64	32	≤8
Cephalothin	1 - 32	≥32	16	≤8
Chloramphenicol	4 - 32	≥32	16	≤8
Ciprofloxacin	0.015 - 2	≥4	2	≤1
Gentamicin	0.25 - 16	≥16	8	≤4
Kanamycin	16 - 64	≥64	32	≤16
Nalidixic Acid	4 - 64	≥32		≤16
Streptomycin	32 - 256	≥64		≤32
Sulfamethoxazole	128 - 512	≥512		≤256
Tetracycline	4 - 64	≥16	8	≤4
Ticarcillin	2 - 128	≥128	32	≤16
Trimethoprim/ Sulfamethoxazole	0.12/2.4 - 4/76	≥4/76		≤2/38

* ranges were chosen to detect incremental changes in resistance based on previous 2 year data; ranges may be outside of the

RESULTS - Veterinary Isolates

Amoxicillin/Clavulanic Acid	0.5/0.25 - 32/16	>32	16	≤8
Ampicillin	2 - 64	>32	16	≤8
Apramycin	2 - 16	>32	16	≤8
Ceftiofur	0.5 - 16	≥8	4	≤2
Ceftriaxone	0.25 - 16	≥64	32	≤8
Cephalothin	1 - 32	>32	16	≤8
Chloramphenicol	4 - 32	>32	16	≤8
Ciprofloxacin	0.015 - 2	≥4	2	≤1
Gentamicin	0.25 - 16	≥16	8	≤4
Kanamycin	16 - 64	≥64	32	≤16
Nalidixic Acid	4 - 64	>32		≤16
Streptomycin	32 - 256	≥64		≤32
Sulfamethoxazole	128 - 512	≥512		≤256
Tetracycline	4 - 64	≥16	8	≤4
Ticarcillin	2 - 128	≥128	32	≤16
Trimethoprim/ Sulfamethoxazole	0.12/2.4 - 4/76	≥4/76		≤2/38

* ranges were chosen to detect incremental changes in resistance based on previous 2 year data; ranges may be outside of the breakpoint value

RESULTS - Veterinary Isolates

TABLE 1. Top 15 Salmonella serotypes identified for 1997 (N=2,391 total isolates) for all animal species

Serotype	Serogroup	Frequency (n)	Percent of Total
Montevideo	C1	221	9.2
Kentucky	C3	177	7.4
Typhimurium (copenhagen)*	B	171	7.2
Anatum	E4	169	7.1
Typhimurium*	B	157	6.6
Heidelberg	B	146	6.1
Agona	B	141	5.9
Cerro	K	116	4.9
Mbandaka	C1	92	3.8
Muenster	E1	89	3.7
Derby	B	70	2.9
Worthington	G2	62	2.6
Menhaden	E3	61	2.6
Meleagridis	E1	57	2.4
Hadar	C2	56	2.3

* typhimurium and typhimurium (copenhagen) isolates combined account for 328 (13.7%) of the total number of isolates

TABLE 2: Distribution of isolates by species and clinical status

CLINICAL (isolates collected from NVSL; N=763)

Species	Total Number
Cattle	183
Swine	195
Chicken	153
Exotic	65
Turkey	49
Dog	38
Horse	52
Cat	28

NONCLINICAL (N=1,628)

Species	Number
Cattle	859*
Swine	225
Cattle feed	2
Swine feed	20
HACCP**	521
Chicken	214
Turkey	164
Swine	117
Cattle	28
Egg	6
Misc***	2

*includes 99 samples which are of unidentified clinical status **samples collected from carcasses at slaughter with the exception of eggs
***species unknown

TABLE 3: Total percent sensitive, intermediate or resistant

	Susceptible		Intermediate		Resistant	
	n	%	n	%	n	%
Antimicrobial						
Amikacin	2391	100	0	0	0	0
Amoxicillin/Clavulanic Acid	2215	92.6	135	5.6	42	1.8
Ampicillin	2104	88.0	0	0	288	12.0
Apramycin	2345	98.1	4	0.2	41	1.7
Ceftiofur	2367	99.0	2	0.1	22	0.9
Ceftriaxone	2374	99.3	11	0.5	6	0.3
Cephalothin	2281	95.4	54	2.3	56	2.3
Chloramphenicol	2273	95.0	8	0.3	111	4.6
Ciprofloxacin	2391	100	0	0	0	0
Gentamicin	2211	92.5	39	1.6	140	5.8
Kanamycin	2145	89.7	4	0.2	242	10.1
Nalidixic Acid	2373	99.2	0	0	18	0.8
Streptomycin	1970	82.4	0	0	423	17.6
Sulfamethoxazole	1968	82.3	0	0	425	17.7
Tetracycline	1727	72.2	9	0.4	658	27.4
Ticarclillin	2109	88.2	4	0.2	278	11.6
Trimethoprim/ Sulfamethoxazole	2341	97.9	0	0	50	2.1

TABLE 4: Percent total resistance by species/sources (includes both clinical and nonclinical isolates)

Antimicrobial	Cattle n=1,068	Swine n=534	SPECIES Chicken n=367	Turkey n=211	Horse n=52
Amikacin	0	0	0	0	0
Amoxicillin/Clavulanic Acid	1.2	0.6	1.1	7.6	3.8
Ampicillin	9.3	12.7	11.2	18.5	19.2
Apramycin	0.1	6.6	0	1.9	0
Ceftiofur	0.2	0.4	0.3	6.2	1.9
Ceftriaxone	0.1	0	0	2.4	0
Cephalothin	1.6	0.7	2.5	8.5	7.7
Chloramphenicol	2.3	8.1	2.2	7.6	9.6
Ciprofloxacin	0	0	0	0	0
Gentamicin	0.5	4.9	14.4	24.2	7.7
Kanamycin	6.6	13.1	3.5	27.5	19.2
Nalidixic Acid	0	0	0.3	8.1	0
Streptomycin	9.6	23	22.1	37.9	17.3
Sulfamethoxazole	8.2	23.6	21.8	42.2	21.2
Tetracycline	13.9	50.2	17.4	58.3	23.1

Ticarcillin	8.8	12.7	11.2	17.5	19.2
Trimethoprim/ Sulfamethoxazole	0.7	5.2	0.8	2.8	9.6

TABLE 4: Percent total resistance by species/sources (includes both clinical and nonclinical isolates; continued)

Antimicrobial	SPECIES					
	Cattle Feed n=2	Swine Feed n=20	Exotic n=65	Dog n=38	Cat n=28	Egg n=6
Amikacin	0	0	0	0	0	0
Amoxicillin/Clavulanic Acid	0	5.0	0	0	10.7	0
Ampicillin	0	5.0	3.1	31.6	53.6	0
Apramycin	0	5.0	0	0	3.6	0
Ceftiofur	0	0	0	0	10.7	0
Ceftriaxone	0	0	0	0	0	0
Cephalothin	0	5.0	0	0	10.7	0
Chloramphenicol	0	0	0	13.2	28.6	0
Ciprofloxacin	0	0	0	0	0	0
Gentamicin	0	5.0	0	0	0	0
Kanamycin	0	10.0	3.1	18.4	32.1	0
Nalidixic Acid	0	0	0	0	0	0

Streptomycin	0	20.0	3.1	23.7	35.7	0
Sulfamethoxazole	0	5.0	3.1	31.6	50.0	0
Tetracycline	0	35.0	6.2	36.8	57.1	0
Ticarcillin	0	0	3.1	31.6	50.0	0
Trimethoprim/ Sulfamethoxazole	0	0	1.5	0	0	0

Note: 2 isolates that were unidentified were not resistant to any antimicrobial

Table 5: Percent resistance for non-clinical isolates (excluding HACCP samples)

Antimicrobial	Cattle n=760	Swine n=225
Amikacin	0	0
Amoxicillin/Clavulanic Acid	1.1	0.9
Ampicillin	4.1	1.3
Apramycin	0	10.7
Ceftiofur	0	0.4
Ceftriaxone	0	0
Cephalothin	1.7	0.9
Chloramphenicol	1.6	0

Ciprofloxacin	0	0
Gentamicin	0.1	6.7
Kanamycin	1.7	8.4
Nalidixic Acid	0	0
Streptomycin	4.1	7.6
Sulfamethoxazole	2.9	0.9
Tetracycline	8.0	27.6
Ticarcillin	3.6	1.3
Trimethoprim/ Sulfamethoxazole	0.1	0

Note: Samples are included only if they were able to be identified as non-clinical. This does not include 99 samples of undetermined clinical status

Table 6: Percent resistance for HACCP samples

Antimicrobial	SPECIES					
	Cattle n=26	Swine n=113	Chicken n=214	Turkey n=162	Egg n=6	
	Amoxicillin/Clavulanic Acid	7.7	0	0.5	6.8	0
	Ampicillin	19.2	16.8	11.7	13.0	0
	Apramycin	0	2.7	0	0.6	0
Ceftiofur	0	0.9	0.5	5.6	0	

Ceftriaxone	0	0	0	1.9	0
Cephalothin	0	0.9	1.4	7.4	0
Chloramphenicol	11.5	11.5	2.3	5.6	0
Ciprofloxacin	0	0	0	0	0
Gentamicin	0	1.8	17.8	18.5	0
Kanamycin	7.7	12.4	2.3	25.3	0
Nalidixic Acid	0	0	0	4.9	0
Streptomycin	19.2	27.4	24.3	35.2	0
Sulfamethoxazole	26.9	33.6	24.8	37.0	0
Tetracycline	30.8	51.3	20.6	54.9	0
Ticarcillin	19.2	16.8	11.7	13.0	0
Trimethoprim/ Sulfamethoxazole	3.8	1.8	0.5	3.7	0

Table 7: Percent resistance for clinical isolates*

Antimicrobial	SPECIES				
	Cattle n=183	Swine n=195	Chicken n=153	Turkey n=49	Horse n=52
Amikacin	0	0	0	0	0
Amoxicillin/Clavulanic Acid	1.6	0.5	2.0	10.2	3.8

Ampicillin	32.2	23.6	10.5	36.7	19.2
Apramycin	0.6	3.6	0	6.1	0
Ceftiofur	0.6	0	0	8.2	1.9
Ceftriaxone	0.6	0	0	4.1	0
Cephalothin	1.6	0.5	3.9	12.2	7.7
Chloramphenicol	5.5	15.4	2.0	14.3	9.6
Ciprofloxacin	0	0	0	0	0
Gentamicin	2.2	4.6	9.8	42.9	7.7
Kanamycin	29.0	19.0	5.2	34.7	19.2
Nalidixic Acid	0	0	0.7	18.4	0
Streptomycin	33.9	38.5	19.0	46.9	17.3
Sulfamethoxazole	30.6	44.1	17.6	59.2	21.2
Tetracycline	36.6	75.4	13.1	69.4	23.1
Ticarcillin	31.7	23.6	10.5	32.7	19.2
Trimethoprim/ Sulfamethoxazole	1.6	13.3	1.3	0	9.6

Note: Clinical isolates in Table 7 were all obtained from the National Veterinary Services Laboratories, Ames, IA

Table 7: Percent resistance for clinical isolates* (continued)

Antimicrobial	Exotic n=65	SPECIES	
		Dog n=38	Cat n=28
Amikacin	0	0	0
Amoxicillin/Clavulanic Acid	0	0	10.7
Ampicillin	3.1	31.6	53.6
Apramycin	0	0	3.6
Ceftiofur	0	0	10.7
Ceftriaxone	0	0	0
Cephalothin	0	0	10.7
Chloramphenicol	0	13.2	28.6
Ciprofloxacin	0	0	0
Gentamicin	0	0	0
Kanamycin	3.1	18.4	32.1
Nalidixic Acid	0	0	0
Streptomycin	3.1	23.7	35.7
Sulfamethoxazole	3.1	31.6	50.0
Tetracycline	6.2	36.8	57.1

Ticarcillin	3.1	31.6	50.0
Trimethoprim/ Sulfamethoxazole	1.5	0	0

Note: Clinical isolates in Table 7 were all obtained from the National Veterinary Services Laboratories, Ames, IA

Table 8: Percent total resistance for the top 15 Salmonella serotypes from animal species/sources

Antimicrobial	Montevi. n=221	Kentucky n=177	SEROTYPE Typh(cop) n=171	Anatum n=169	Typhim. n=157
Amikacin	0	0	0	0	0
Amoxicillin/Clavulanic Acid	0.5	1.7	4.7	0.6	7.0
Ampicillin	2.3	2.8	84.2	0.6	35.4
Apramycin	0	0	1.8	9.5	1.3
Ceftiofur	0.9	0	4.1	0	4.4
Ceftriaxone	0	0	1.2	0	1.3
Cephalothin	1.4	1.7	4.7	0.6	5.7
Chloramphenicol	0	0	36.8	0.6	20.9
Ciprofloxacin	0	0	0	0	0

Gentamicin	2.7	1.7	4.1	5.3	8.2
Kanamycin	1.8	1.7	49.7	0.6	19.0
Nalidixic Acid	0	0.6	2.9	0	1.9
Streptomycin	1.8	12.4	70.8	3.0	34.2
Sulfamethoxazole	1.8	3.4	82.5	3.6	38.0
Tetracycline	0.9	13.6	90.1	46.7	35.4
Ticarcillin	1.4	2.8	84.2	0.6	33.8
Trimethoprim/ Sulfamethoxazole	0	1.1	4.7	0	3.8

Table 8: Percent total resistance for the top 15 Salmonella serotypes from animal species/sources (continued)

Antimicrobial	SEROTYPE				
	Heidel. n=146	Agona n=141	Cerro n=116	Mbandaka n=92	Muenster n=89
Amikacin	0	0	0	0	0
Amoxicillin/Clavulanic Acid	1.4	0.7	0.9	0	0
Ampicillin	15.1	2.8	0.9	2.2	2.2
Apramycin	6.2	0	0	0	0
Ceftiofur	0	0.7	0	0	0
Ceftioxone	0	0	0	0	0

Cephalothin	3.4	1.4	0.9	1.1	2.2
Chloramphenicol	0.7	0	0	0	0
Ciprofloxacin	0	0	0	0	0
Gentamicin	27.4	1.4	0	1.1	13.5
Kanamycin	31.5	5.0	0	2.2	13.5
Nalidixic Acid	0	0.7	0	0	0
Streptomycin	45.9	4.3	0	2.2	12.4
Sulfamethoxazole	30.1	15.6	0	25.0	12.4
Tetracycline	34.9	25.5	12.1	33.7	19.1
Ticarcillin	15.1	2.1	0	2.2	2.2
Trimethoprim/ Sulfamethoxazole	0.7	0	0	26.1	0

Table 8: Percent total resistance for the top 15 Salmonella serotypes from animal species/sources (continued)

Antimicrobial	SERO TYPE				
	Derby n=70	Worthing. n=62	Menhaden n=61	Meleagrid. n=57	Hadar n=56
Amikacin	0	0	0	0	0
Amoxicillin/Clavulanic Acid	0	3.2	1.6	0	1.8

Ampicillin	5.7	1.6	0	0	10.7
Apramycin	7.1	1.6	0	0	0
Ceftiofur	0	0	0	0	0
Ceftriaxone	0	0	0	0	0
Cephalothin	0	1.6	1.6	0	5.4
Chloramphenicol	4.3	0	0	0	0
Ciprofloxacin	0	0	0	0	0
Gentamicin	5.7	3.2	0	0	10.7
Kanamycin	10.0	0	0	0	16.1
Nalidixic Acid	0	0	0	0	1.8
Streptomycin	51.4	8.1	0	0	51.8
Sulfamethoxazole	48.6	4.8	0	0	12.5
Tetracycline	58.6	21.0	0	0	89.3
Ticarcillin	2.7	0	0	0	10.7
Trimethoprim/ Sulfamethoxazole	1.4	1.6	0	0	0

Table 9: Multiple antimicrobial resistance

Number of Antimicrobics Resistant to	No. Isolates	Percent
0	1572	65.7
1	225	9.4
2	132	5.5
3	147	6.1
4	50	2.1
5	82	3.4
6	130	5.4
7	21	0.9
8	4	0.2
9	9	0.4
10	5	0.2
11	7	0.3
12	5	0.2
13	2	0.1

Table 10: Most frequent resistance patterns

Antimicrobics	No. Isolates	Percent
Tet	177	7.4
Amp/Kan/Strep/Sulfa/Tet/Tic	79	3.3
Strep/Sulfa/Tet	36	1.5
Amp/Chlor/Strep/Sulfa/Tet/Tic	36	1.5
Strep/Tet	34	1.4
Amp/Chlor/Sulfa/Tet/Tic	30	1.3
Kan/Strep/Tet	27	1.1
Gen/Strep/Sulfa	25	1.0
Sulfa/Tet	24	1.0

Table 11: Most frequent resistance patterns for 5 or more antimicrobics

Antimicrobics	No. Isolates	Percent
Amp/Kan/Strep/Sulfa/Tet/Tic	79	3.3
Amp/Chlor/Strep/Sulfa/Tet/Tic	36	1.5
Amp/Chlor/Sulfa/Tet/Tic	30	1.3
Gen/Kan/Strep/Sulfa/Tet	14	0.5

Amp/Strep/Sulfa/Tet/Tic	8	0.3
Apra/Gen/Kan/Strep/Tet	8	0.3
Amp/Chlor/Kan/Strep/Sulfa/Tet/Tic	6	0.3
Amp/Gen/Strep/Sulfa/Tic	5	0.2
Amp/Kan/Strep/Sulfa/Tic	5	0.2
Amp/Kan/Strep/Tet/Tic	5	0.2
Amp/Kan/Strep/Sulfa/Tet/Tic/Trisulfa	4	0.2
Amp/Apr/Chlor/Gen/Kan/Strep/Sulfa/Tet/Tic	4	0.2

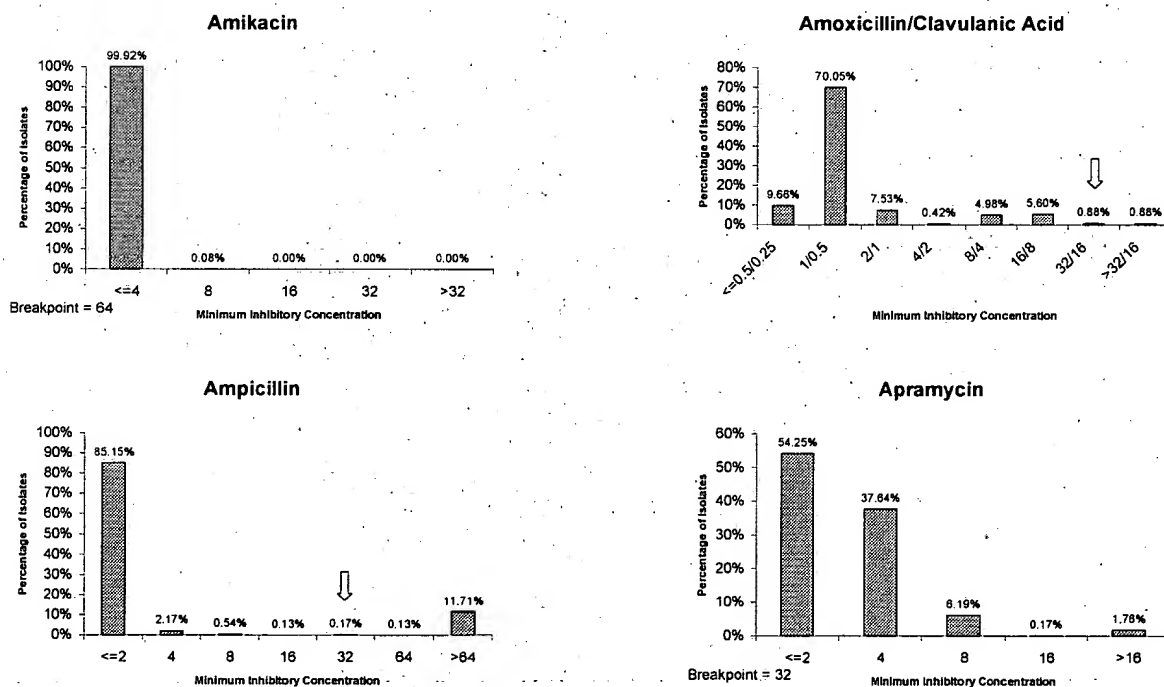
Table 12: Total *S. typhimurium* percent resistance with ACSSuT pattern

Serotype	No. Isolates	No. ACSSuT	Percent ACSSuT	Percent of Total (n=2391) ACSSuT
<i>S. typhimurium</i>	157	26	16.6	1.1
<i>S. typhimurium</i> (cop)	171	32	18.7	1.3
Total	328	58	17.7	2.4

NARMS - EB 1997

Veterinary Isolates

Fig. 1. Minimum Inhibitory Concentrations by Antimicrobial Agent for All Salmonella Isolates



↓ Breakpoint

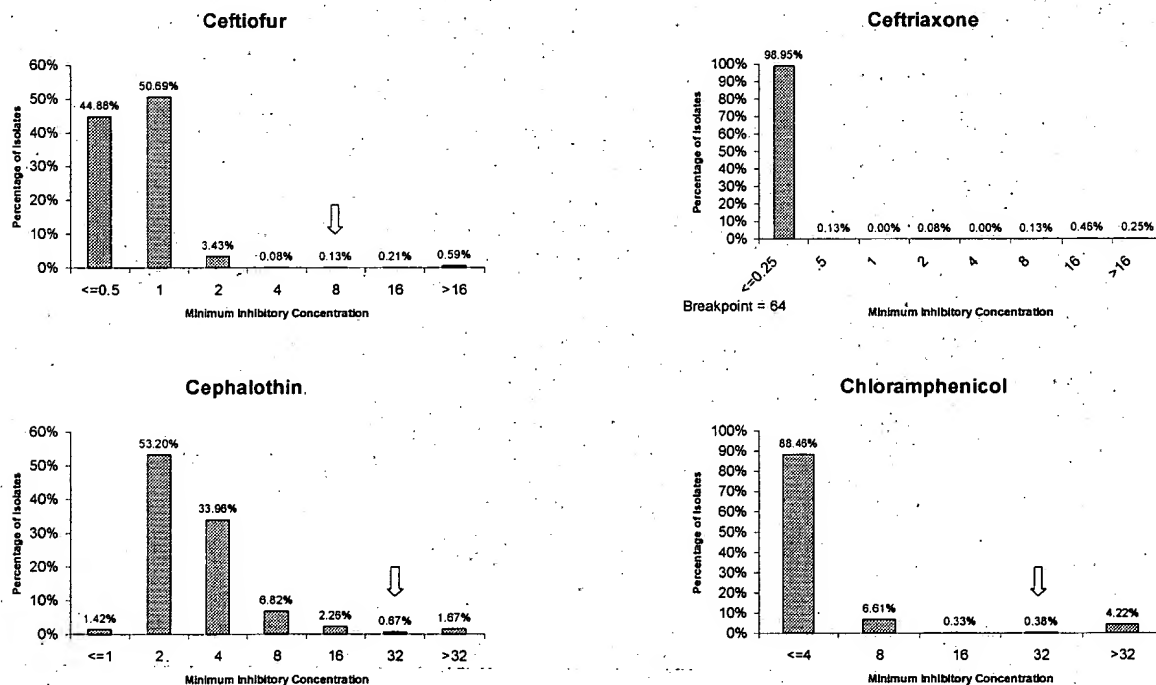
n=2391

27

NARMS - EB 1997

Veterinary Isolates

Fig. 1. Minimum Inhibitory Concentrations by Antimicrobial Agent for All Salmonella Isolates



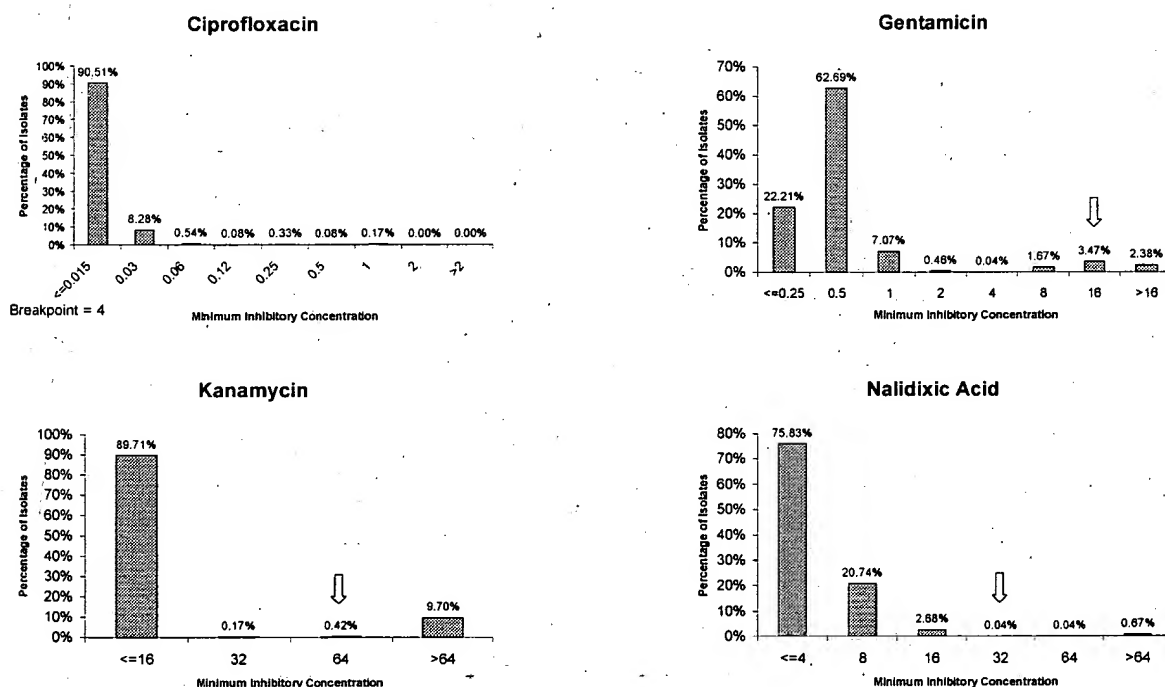
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n=2391

NARMS - EB 1997

Veterinary Isolates

Fig. 1. Minimum Inhibitory Concentrations by Antimicrobial Agent for All Salmonella Isolates



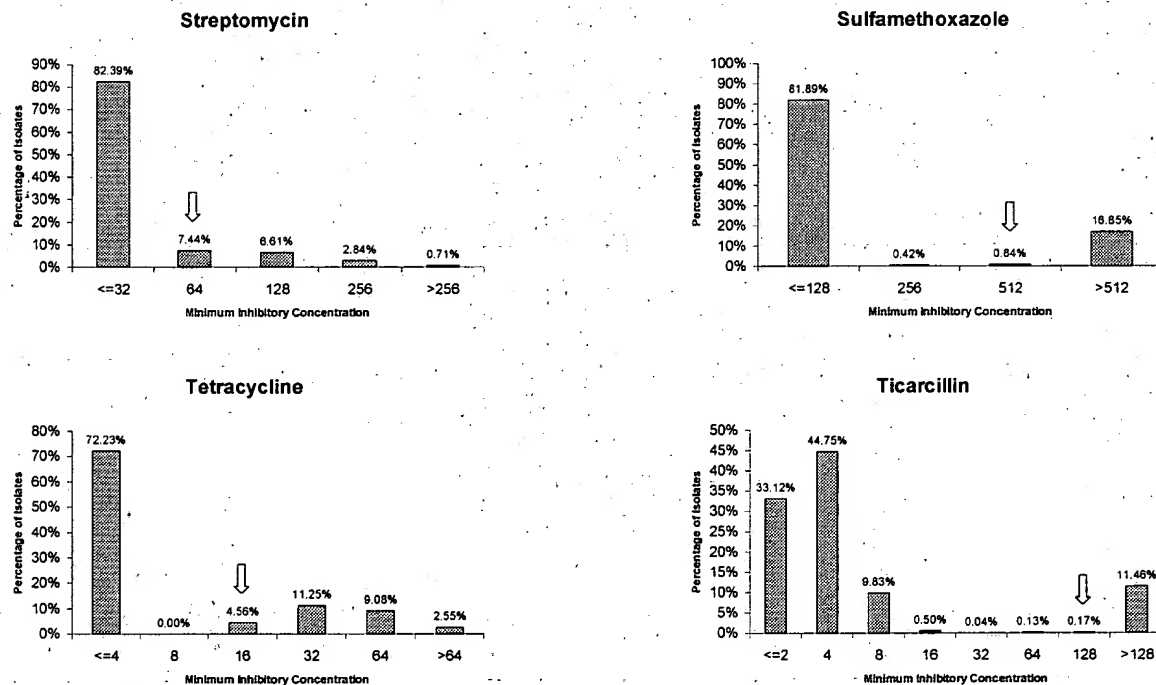
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n=2391

NARMS - EB 1997

Veterinary Isolates

Fig. 1. Minimum Inhibitory Concentrations by Antimicrobial Agent for All Salmonella Isolates



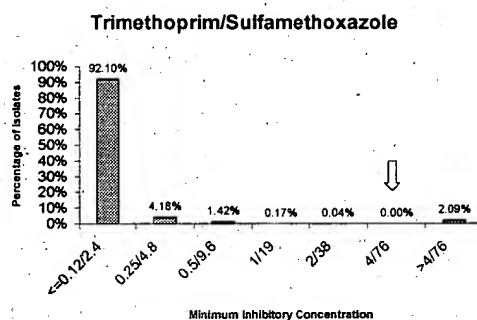
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n=2391

NARMS - EB 1997

Veterinary Isolates

Fig. 1. Minimum Inhibitory Concentrations by Antimicrobial Agent for All Salmonella Isolates



↓ Breakpoint

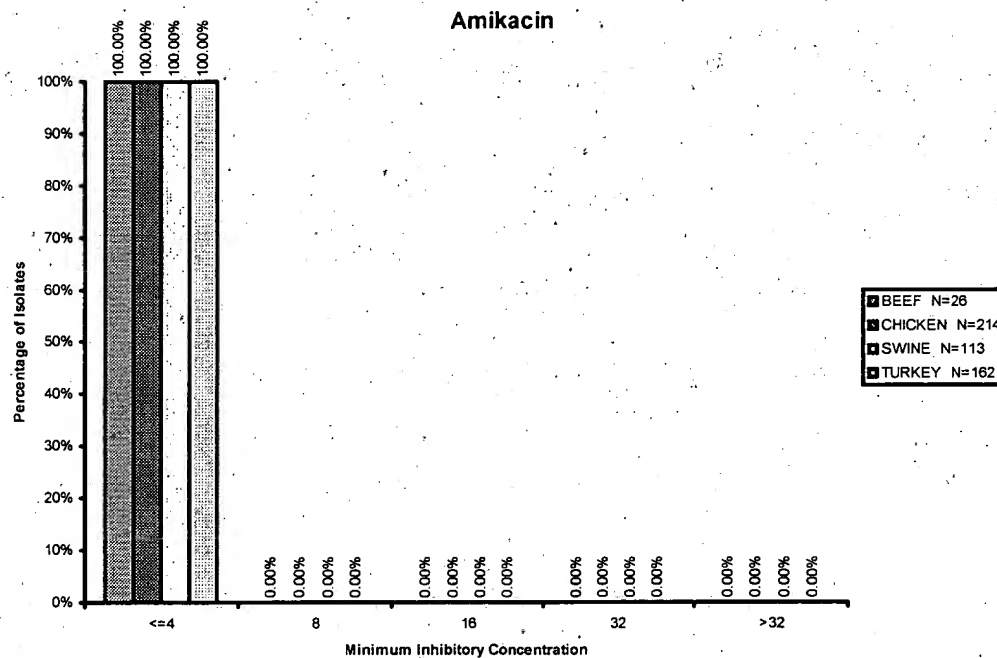
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31

NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

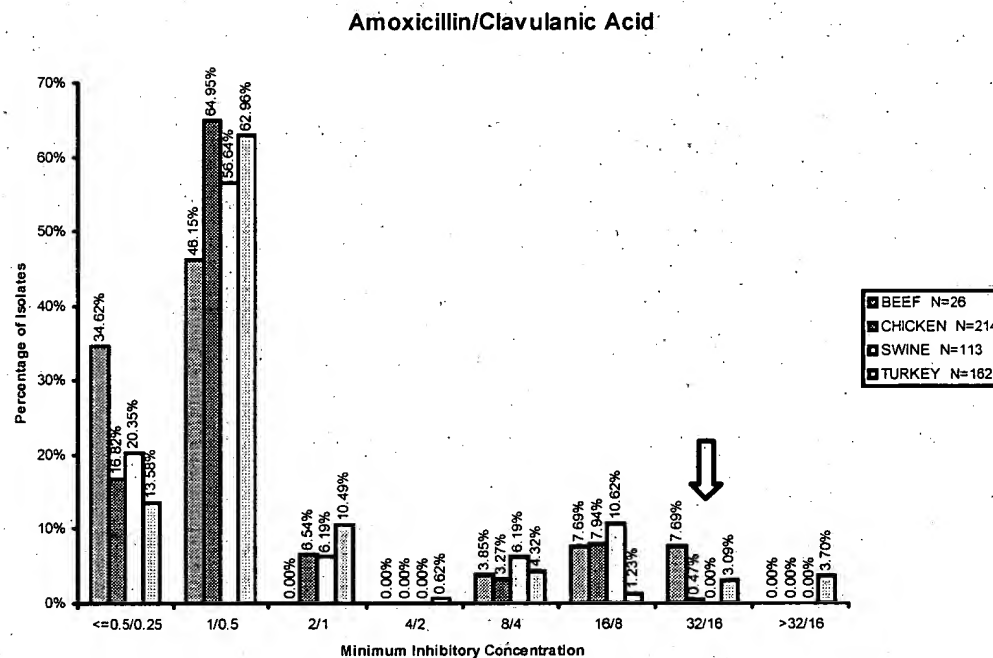


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

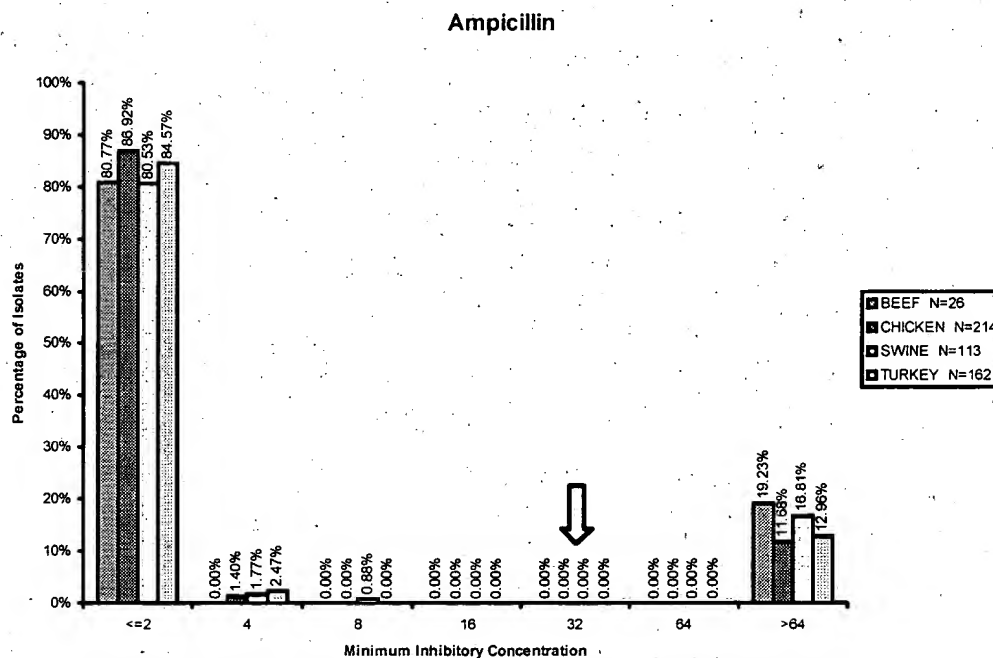


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NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

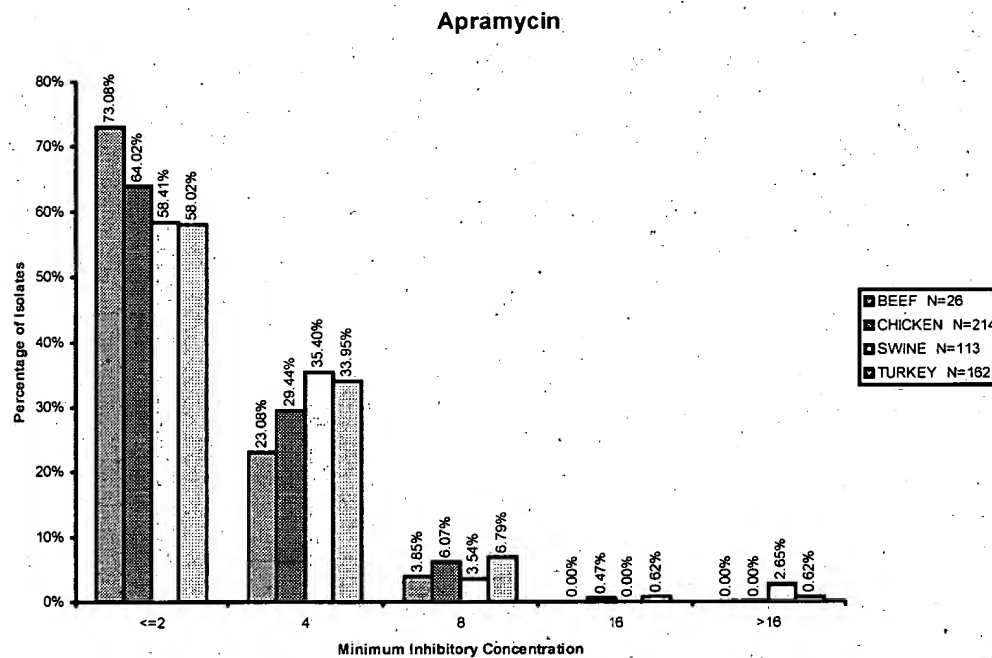


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NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

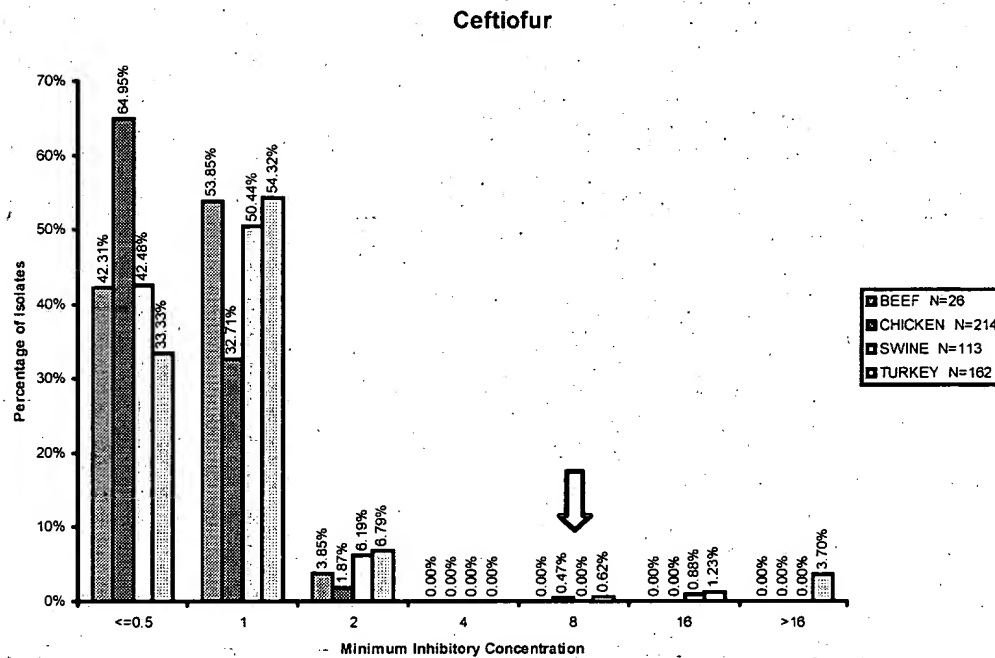


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NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

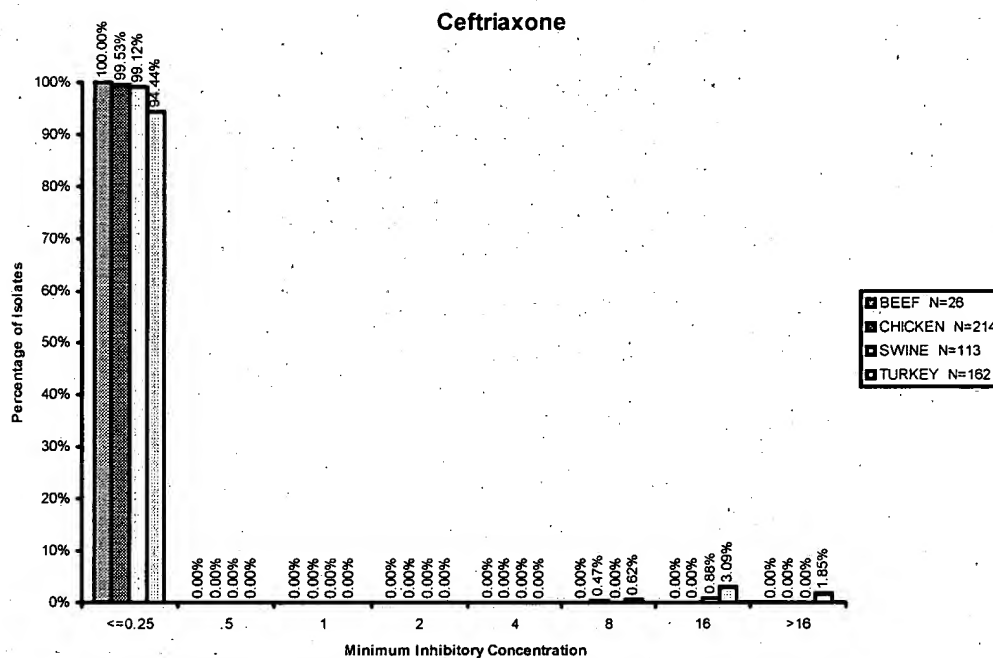


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NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

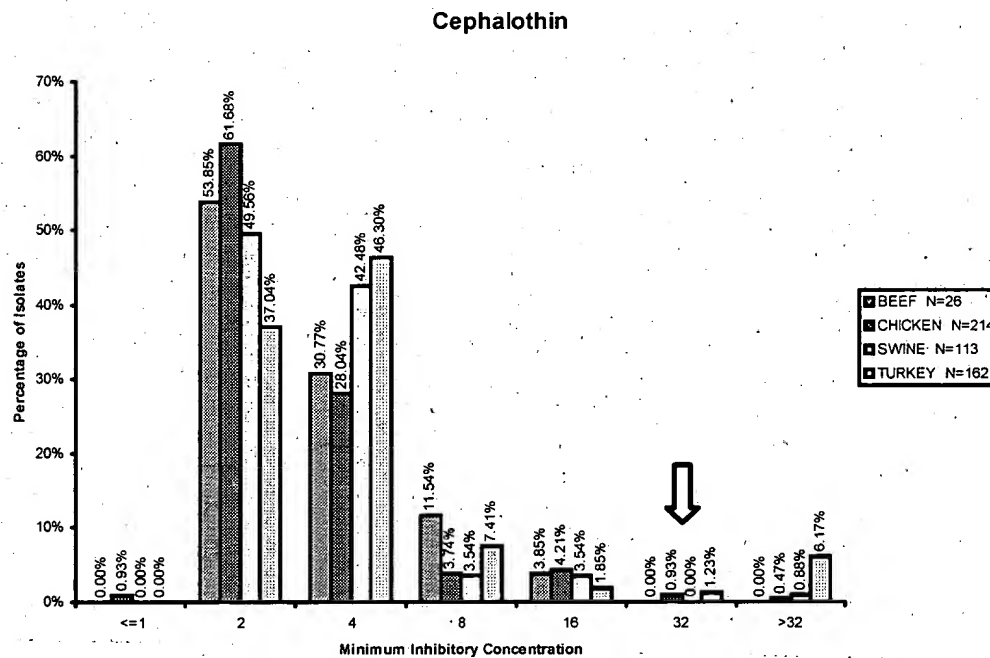


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NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

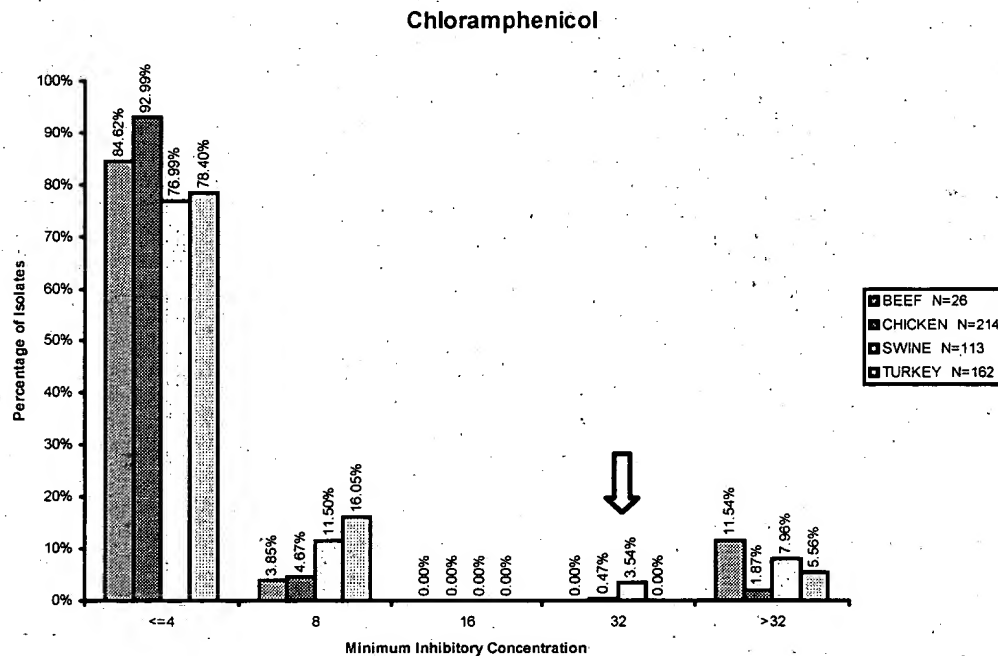


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

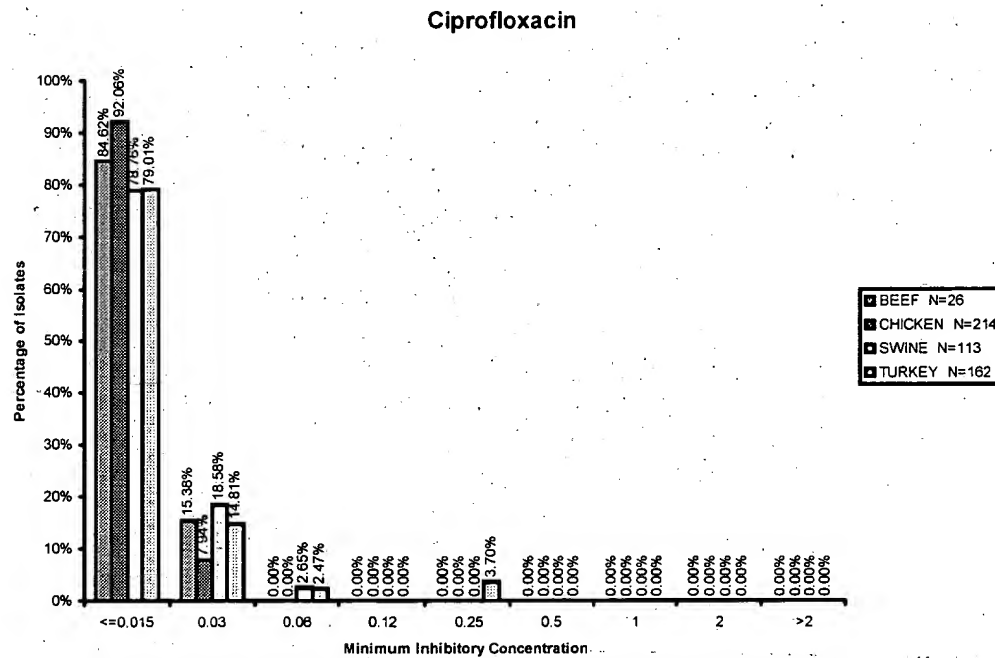


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NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

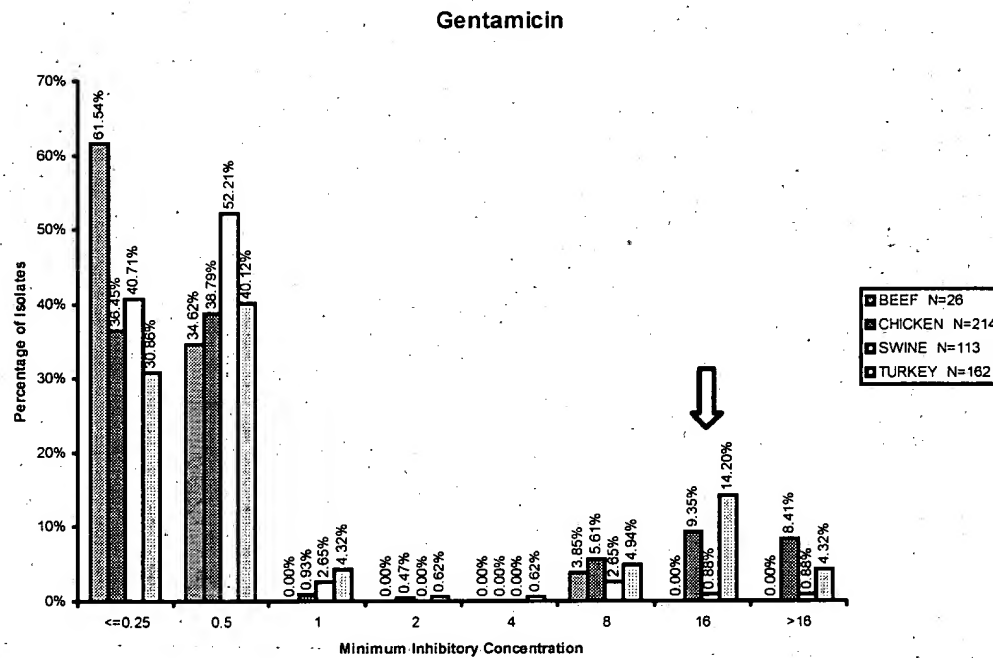


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NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

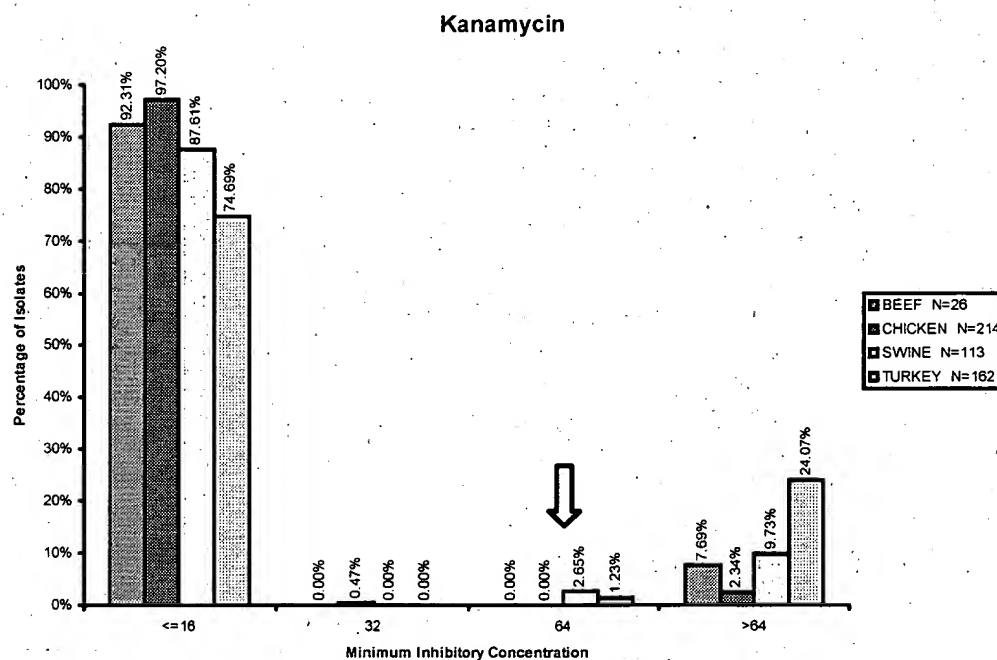


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NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

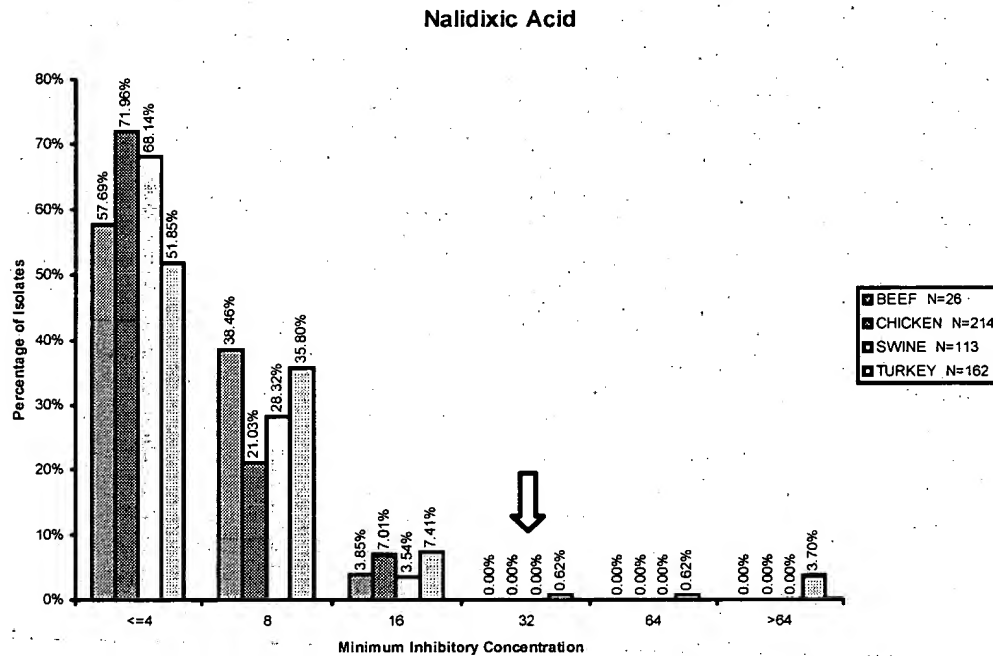


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NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

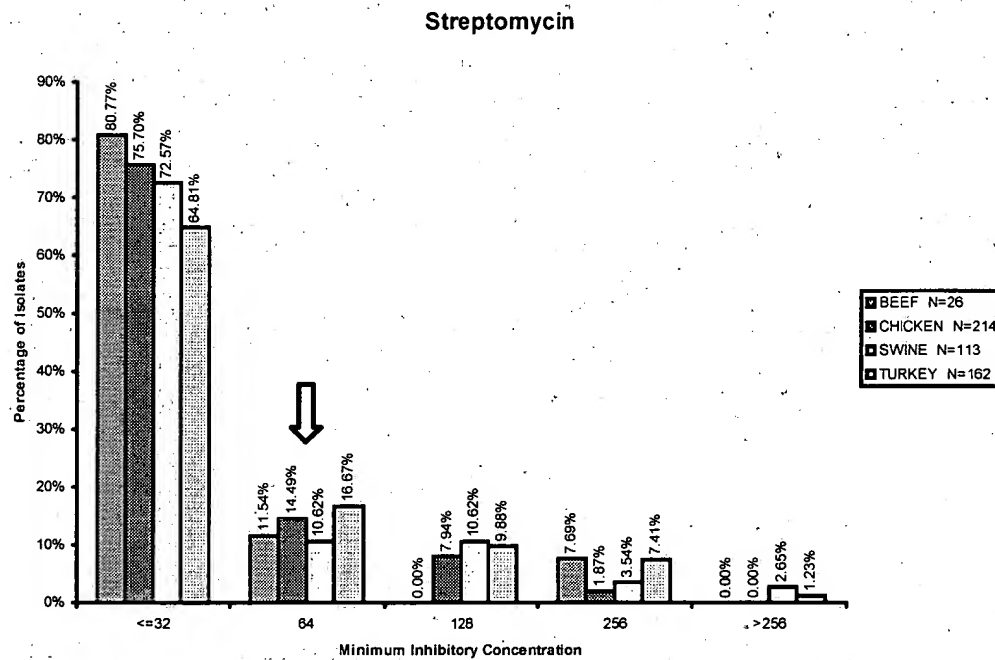


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NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

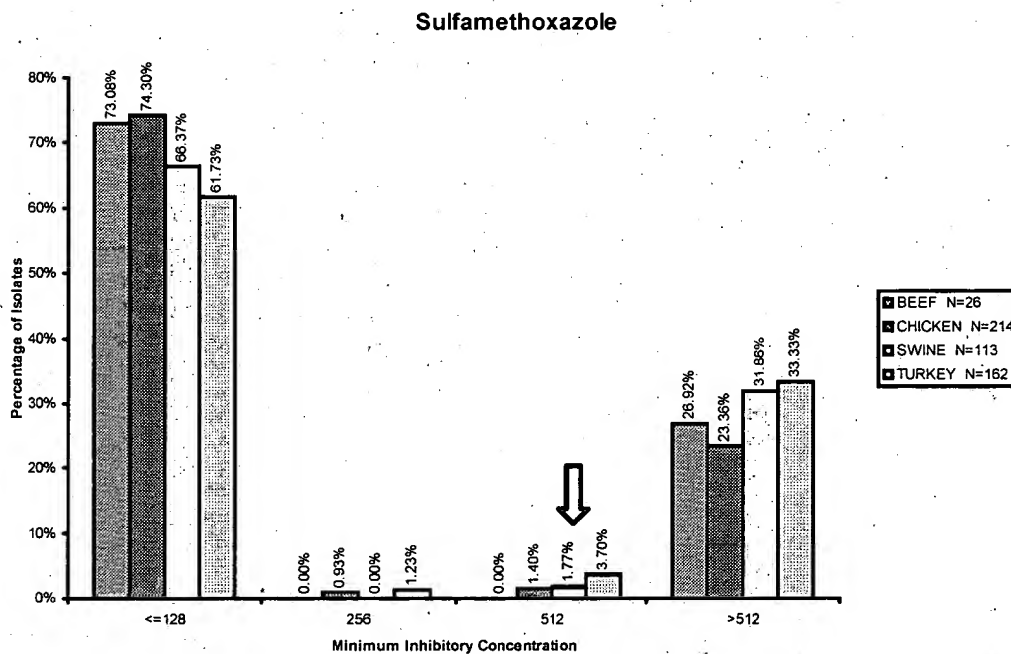


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NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

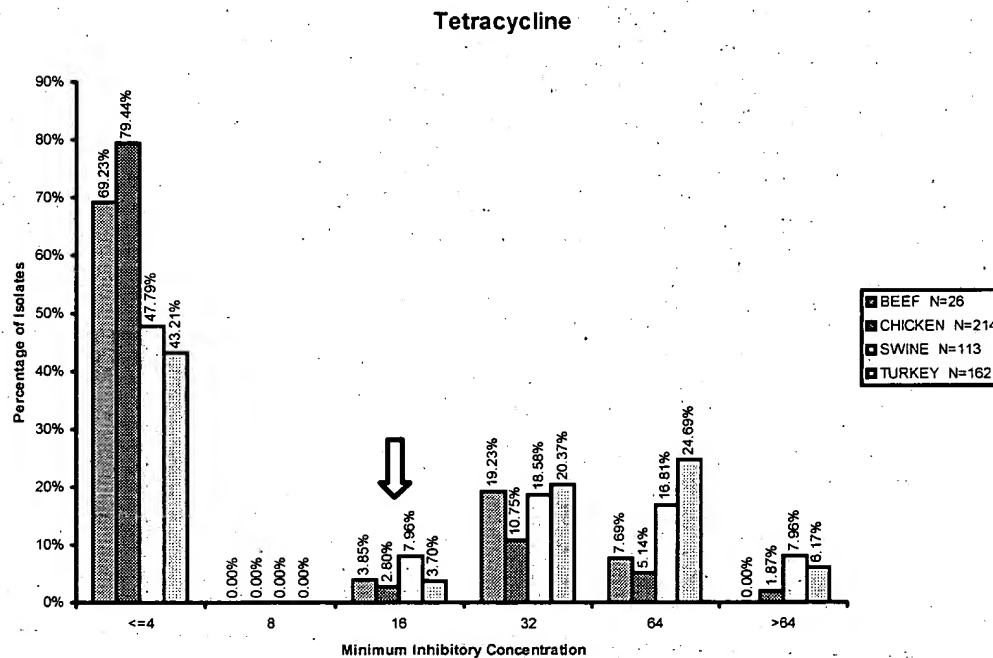


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NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

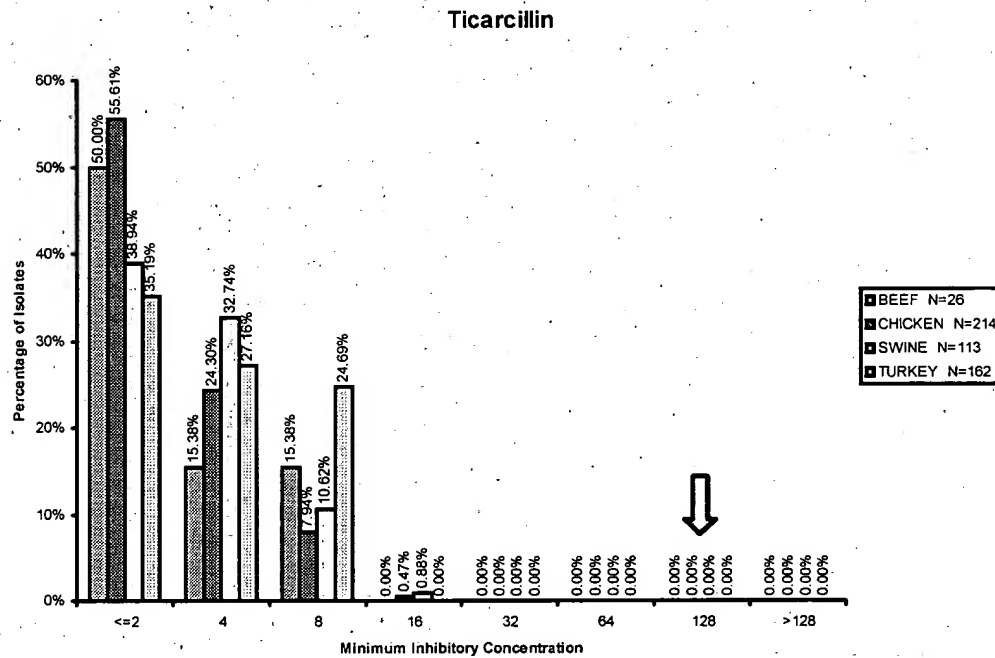


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NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

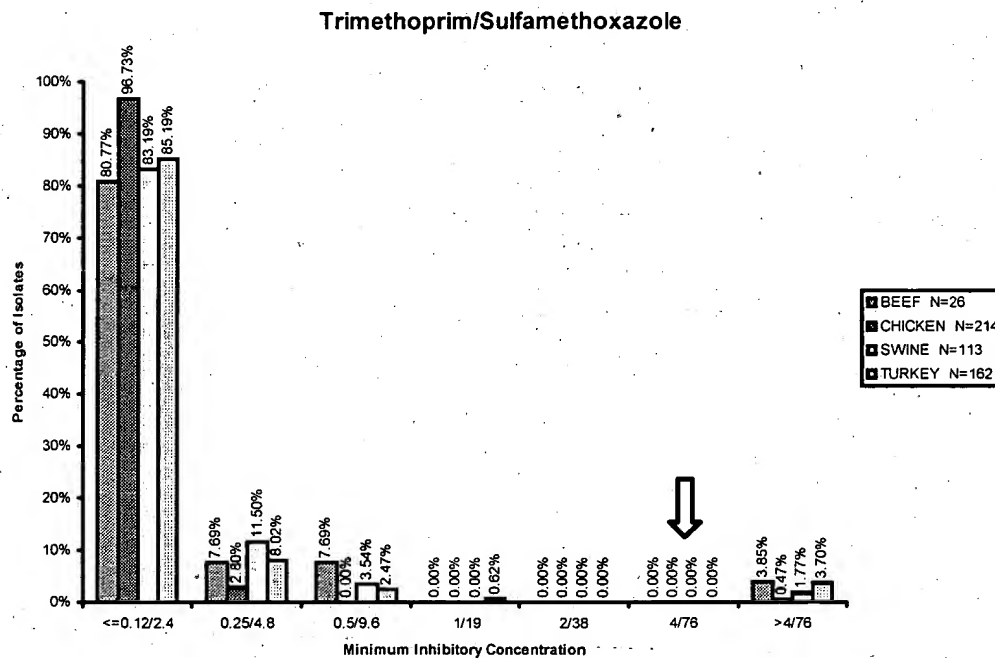


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NARMS - EB 1997

Veterinary Isolates

Fig. 2. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Slaughter

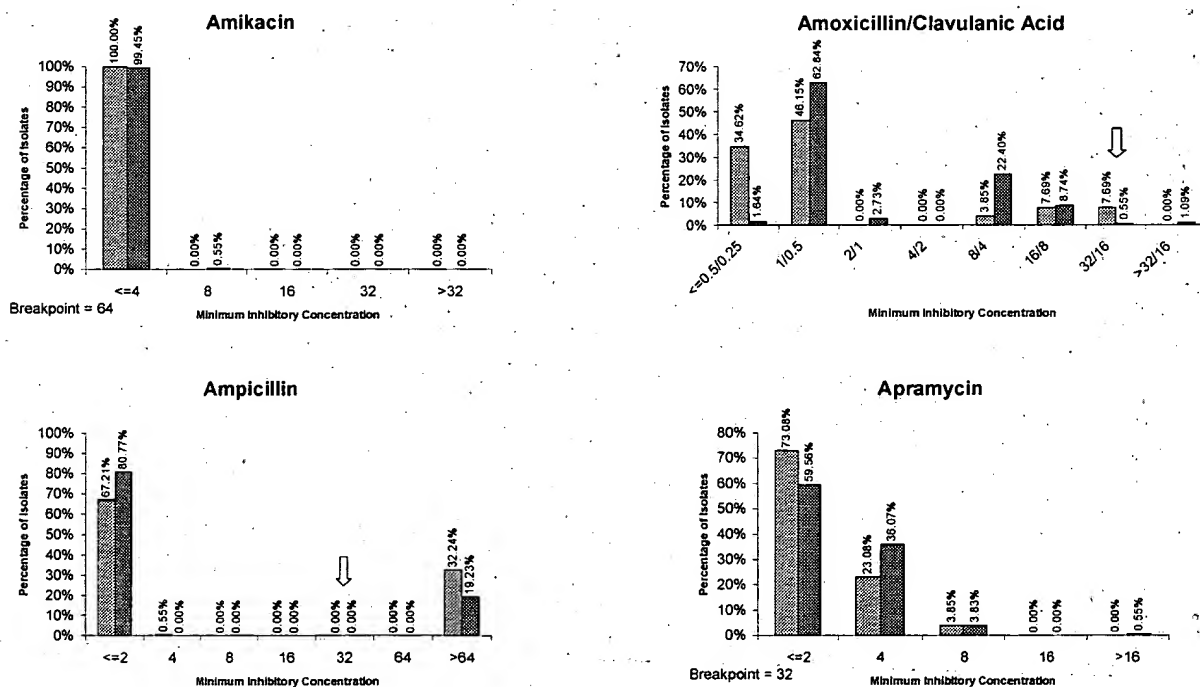


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NARMS - EB 1997

Veterinary Isolates

Fig. 3. Minimum Inhibitory Concentrations by Antimicrobial Agent for All Salmonella Isolates from Cattle



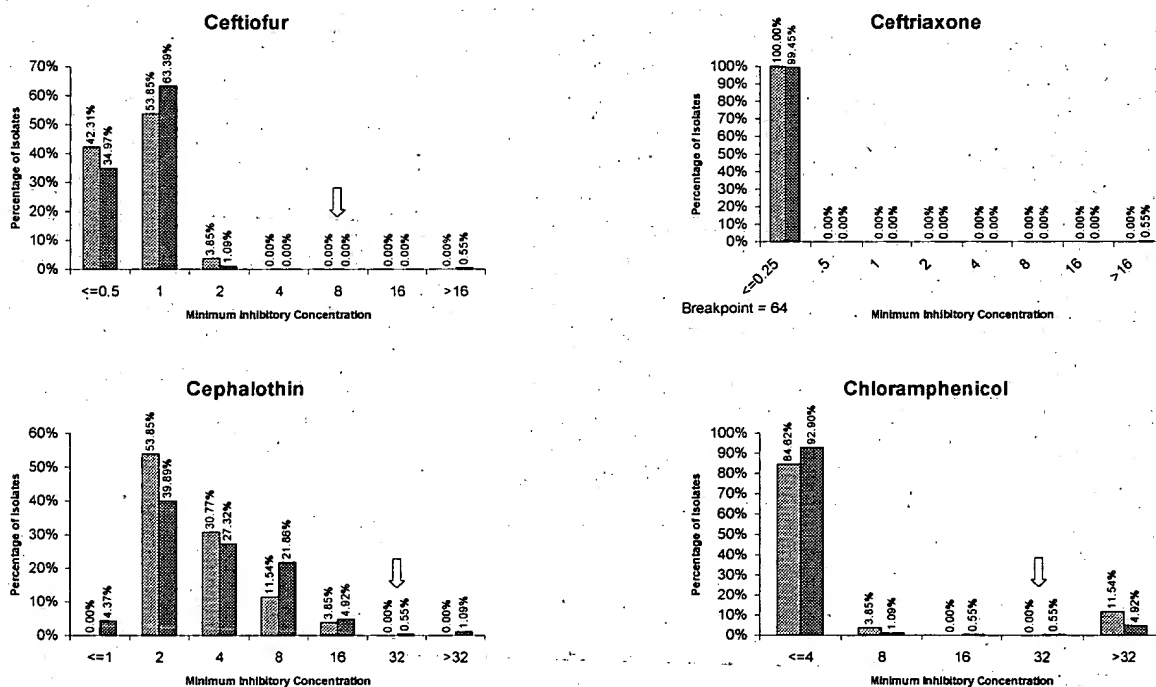
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■ Slaughter n=26; ■ Diagnostic n=183

NARMS - EB 1997

Veterinary Isolates

Fig. 3. Minimum Inhibitory Concentrations by Antimicrobial Agent for All Salmonella Isolates from Cattle



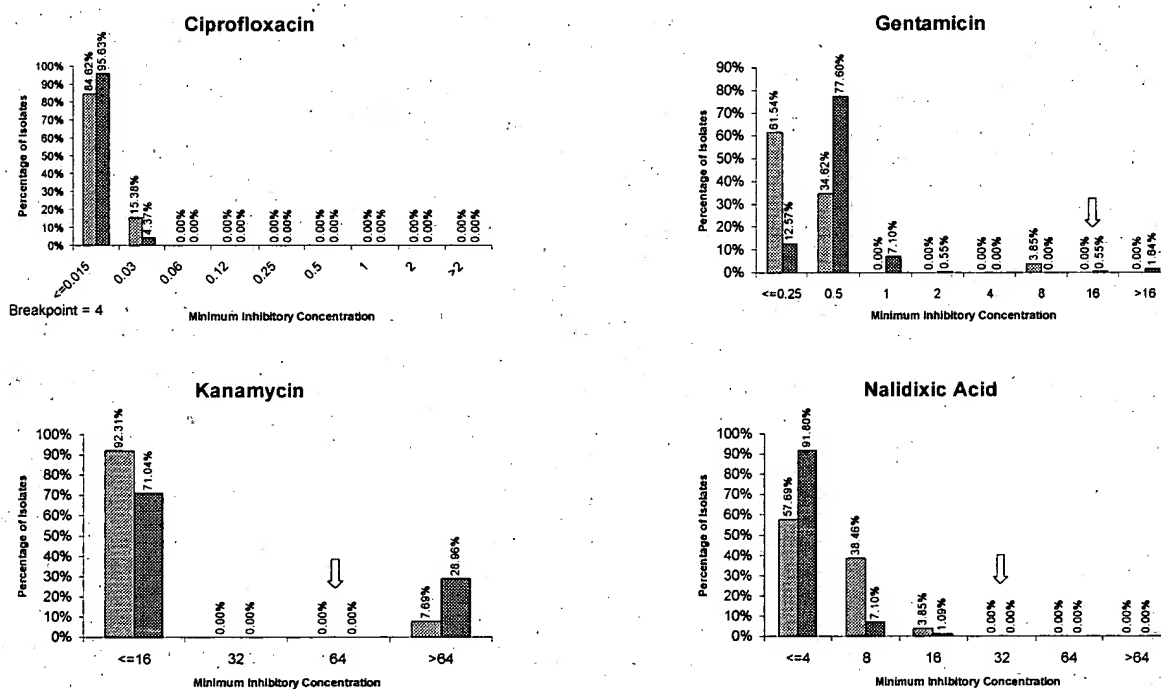
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■ Slaughter n=26; ■ Diagnostic n=183

NARMS - EB 1997

Veterinary Isolates

Fig. 3. Minimum Inhibitory Concentrations by Antimicrobial Agent for All Salmonella Isolates from Cattle



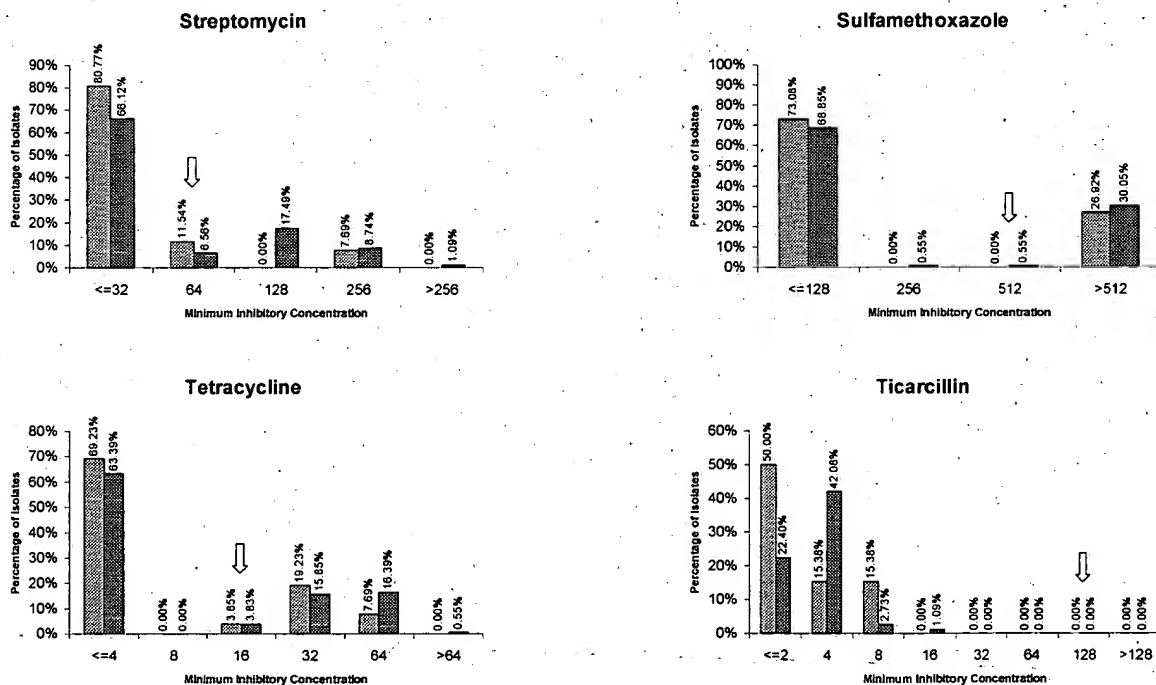
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■ Slaughter n=26; ■ Diagnostic n=183

NARMS - EB 1997

Veterinary Isolates

Fig. 3. Minimum Inhibitory Concentrations by Antimicrobial Agent for All Salmonella Isolates from Cattle



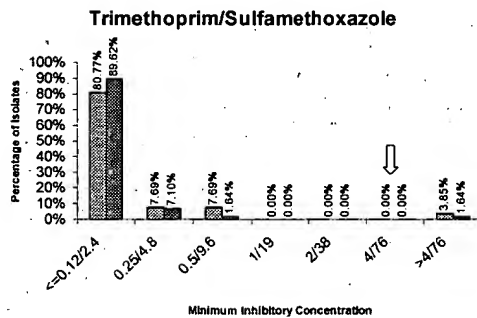
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■ Slaughter n=26; ■ Diagnostic n=183

NARMS - EB 1997

Veterinary Isolates

Fig. 3. Minimum Inhibitory Concentrations by Antimicrobial Agent for All Salmonella Isolates from Cattle



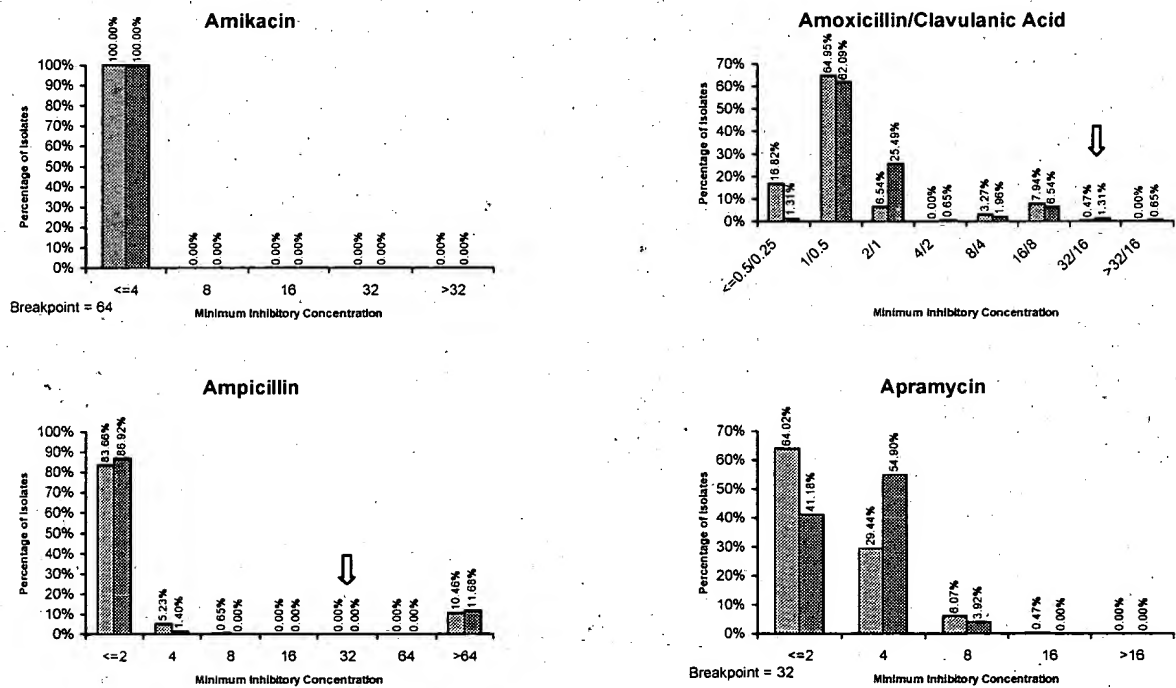
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■ Slaughter n=26; ■ Diagnostic n=183

NARMS - EB 1997

Veterinary Isolates

Fig. 4. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Chicken



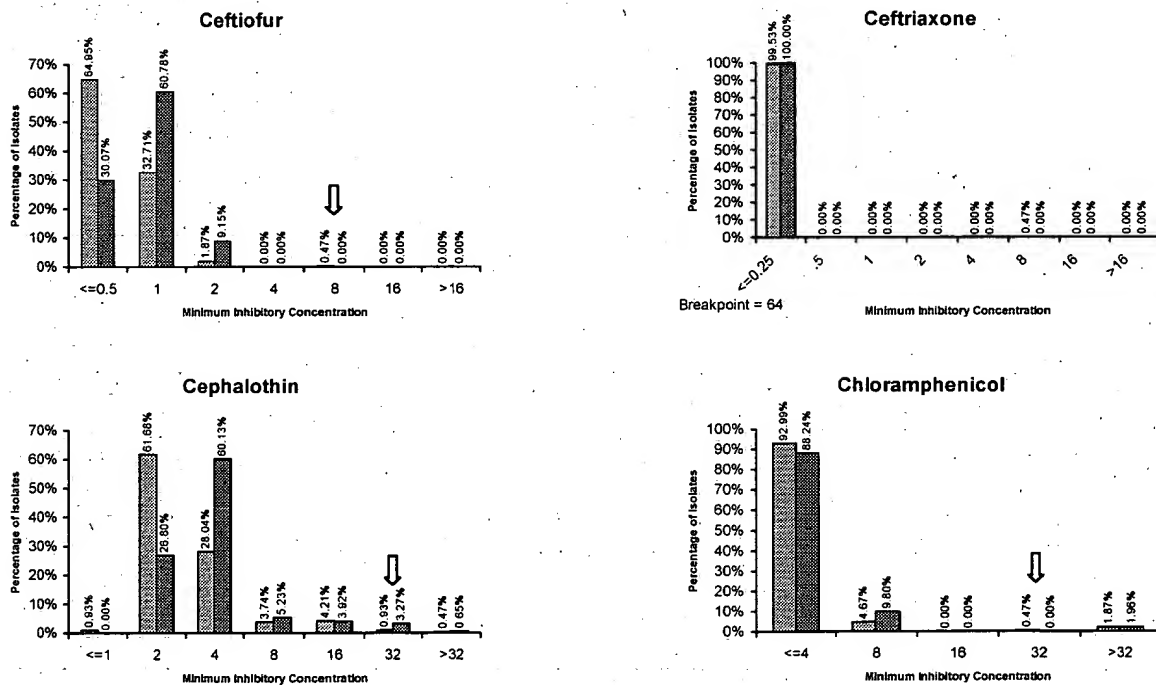
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■ Slaughter n=214; ■ Diagnostic n=153

NARMS - EB 1997

Veterinary Isolates

Fig. 4. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Chicken



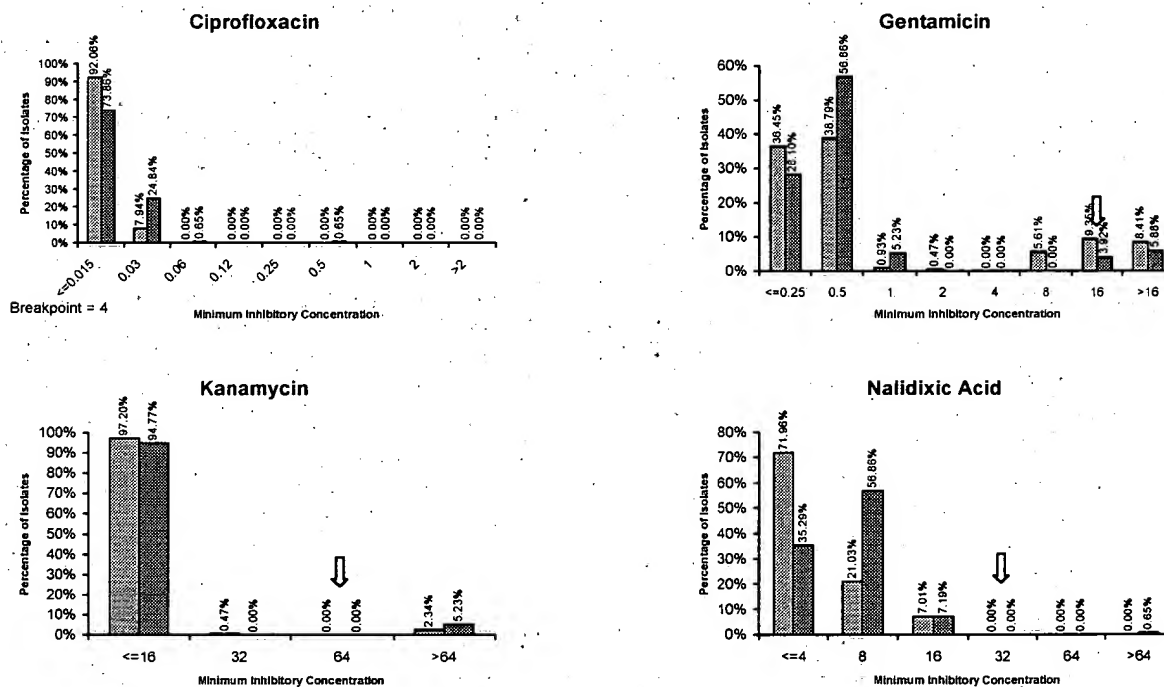
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■ Slaughter n=214; ■ Diagnostic n=153

NARMS - EB 1997

Veterinary Isolates

Fig. 4. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Chicken



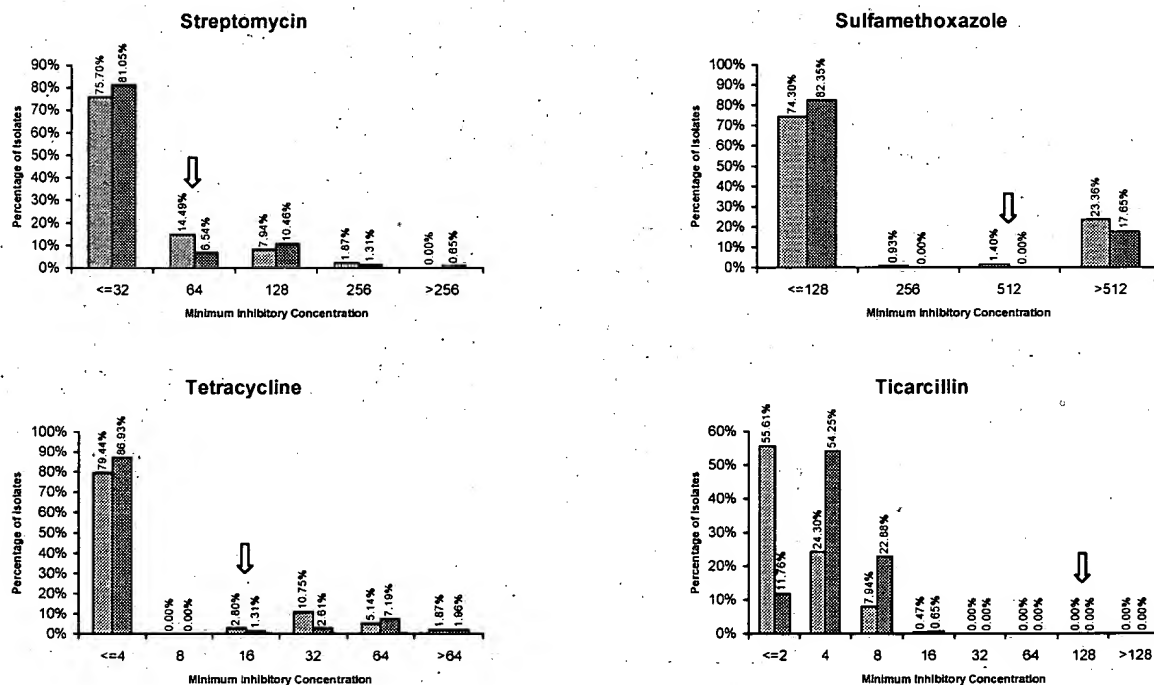
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■ Slaughter n=214; ■ Diagnostic n=153

NARMS - EB 1997

Veterinary Isolates

Fig. 4. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Chicken



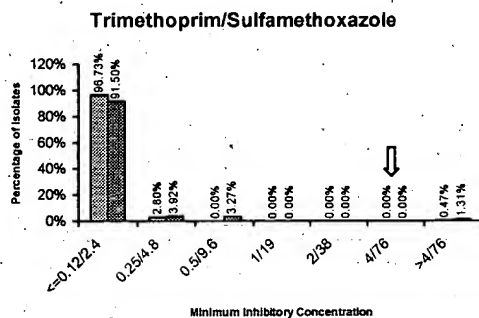
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■ Slaughter n=214; ■ Diagnostic n=153

NARMS - EB 1997

Veterinary Isolates

Fig. 4. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Chicken



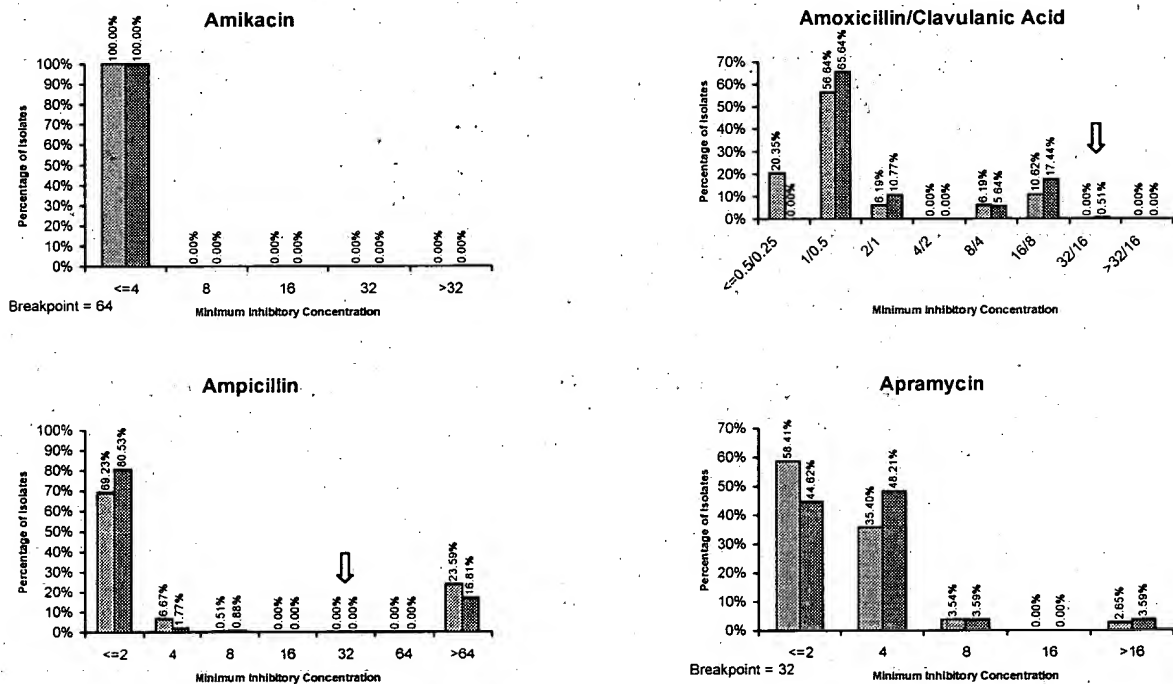
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■ Slaughter n=214; ■ Diagnostic n=153

NARMS - EB 1997

Veterinary Isolates

Fig. 5. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Swine



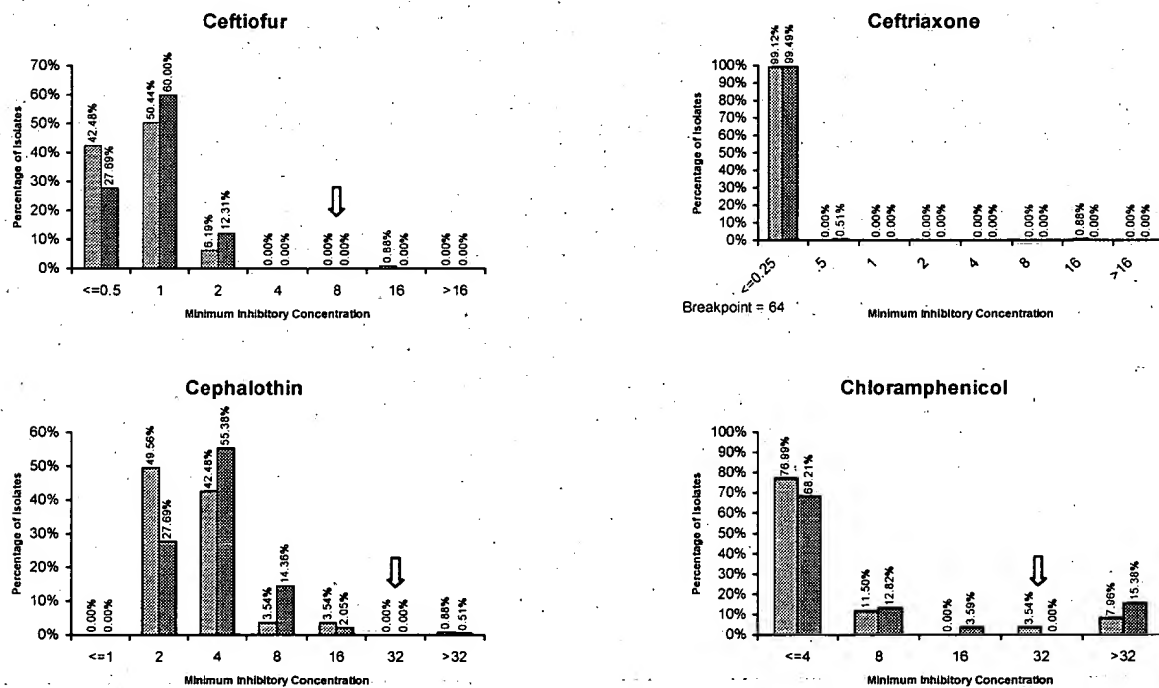
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■ Slaughter n=113; ■ Diagnostic n=195

NARMS - EB 1997

Veterinary Isolates

Fig. 5. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Swine



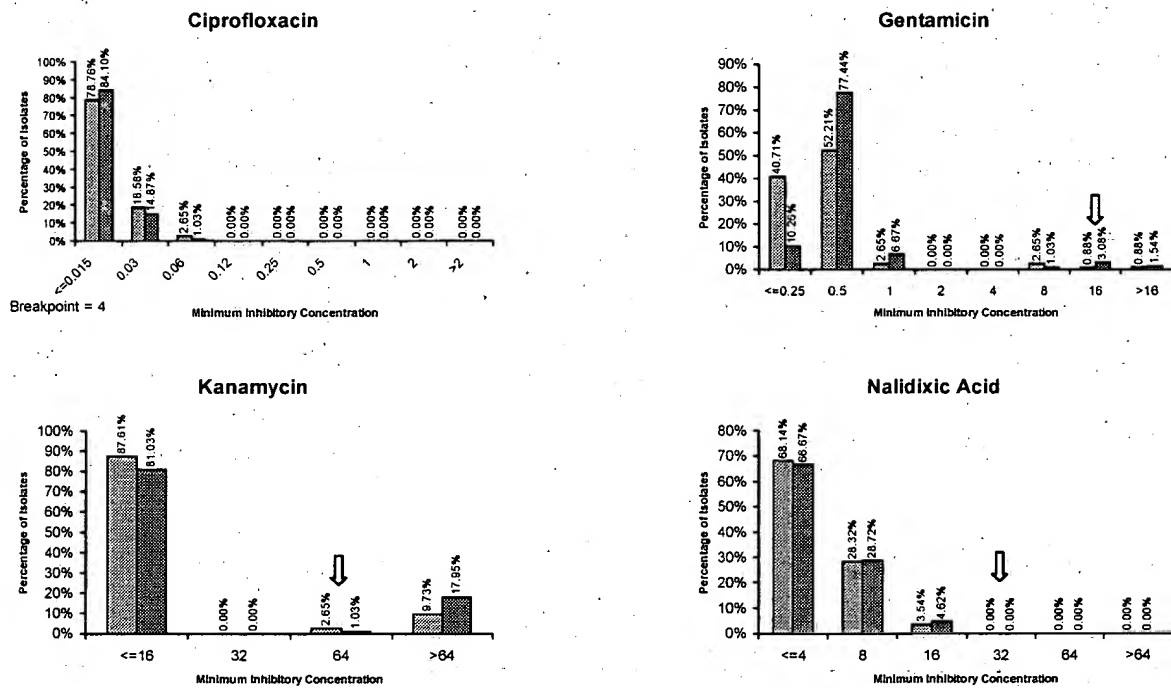
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■ Slaughter n=113; ■ Diagnostic n=195

NARMS - EB 1997

Veterinary Isolates

Fig. 5. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Swine



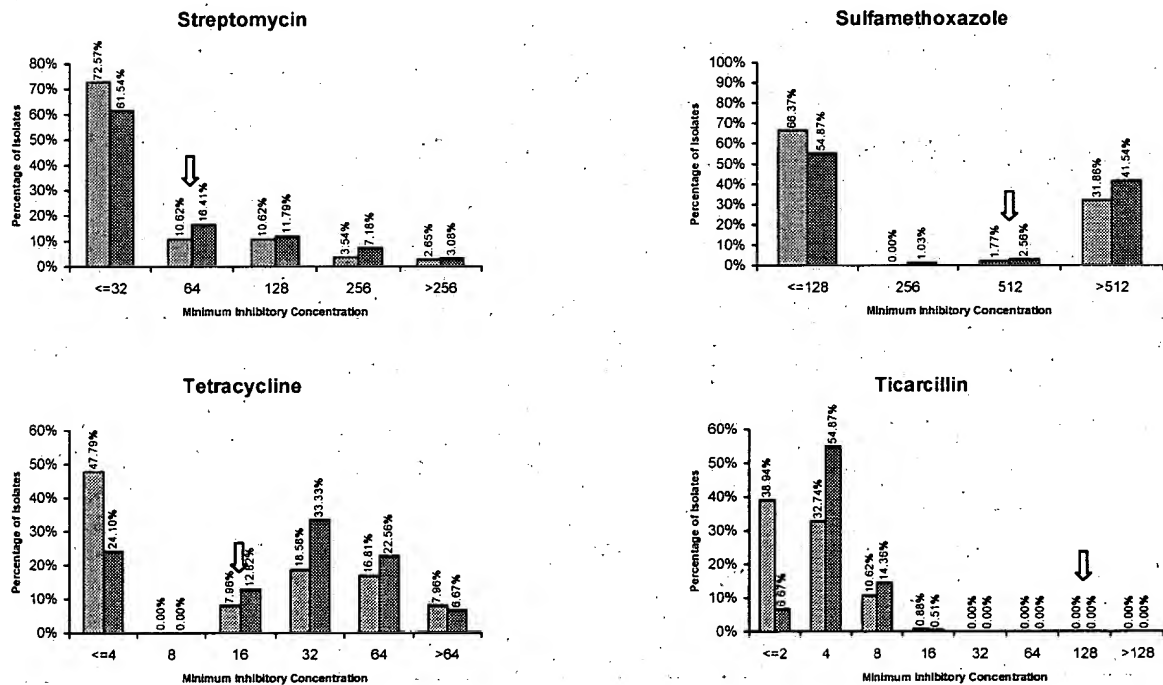
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■ Slaughter n=113; ■ Diagnostic n=195

NARMS - EB 1997

Veterinary Isolates

Fig. 5. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Swine



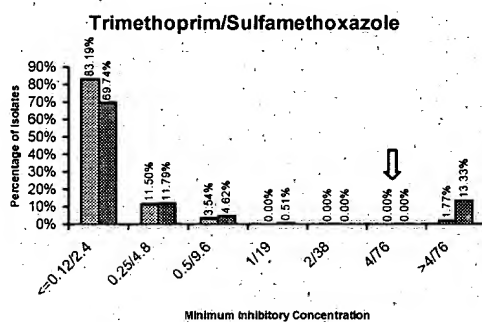
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■ Slaughter n=113; ■ Diagnostic n=195

NARMS - EB 1997

Veterinary Isolates

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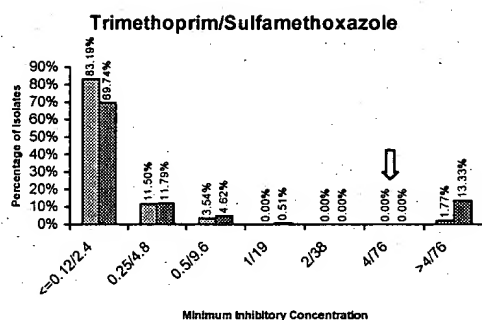
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■ Slaughter n=113; ■ Diagnostic n=195

NARMS - EB 1997

Veterinary Isolates

Fig. 5. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Swine



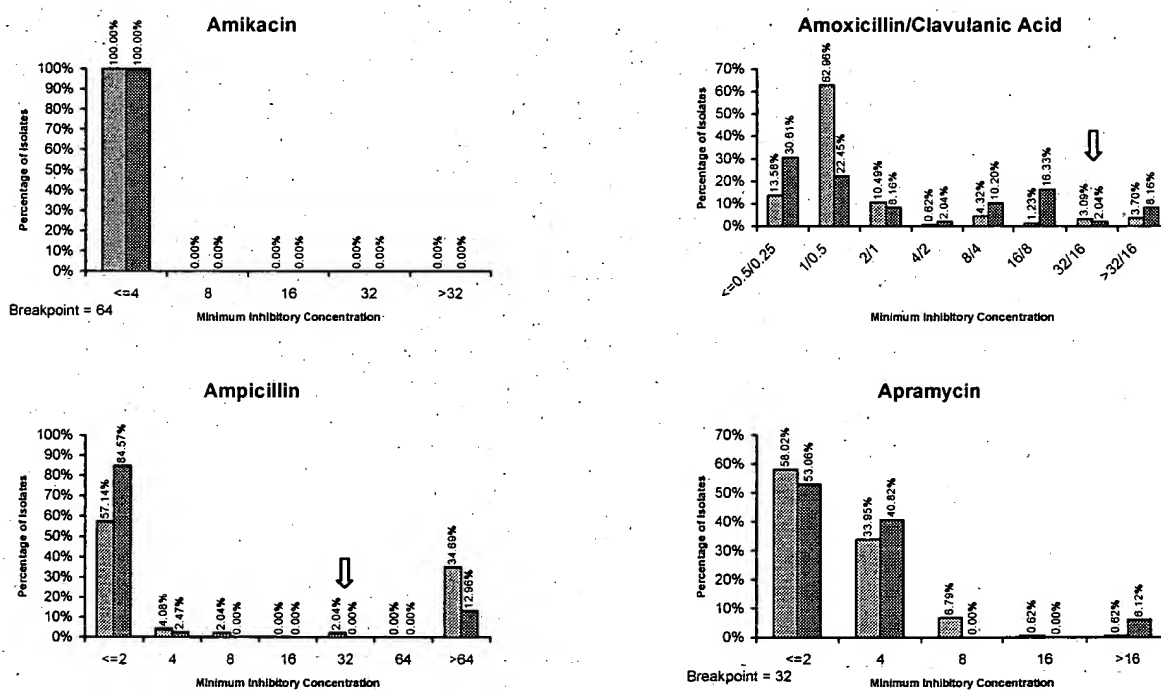
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■ Slaughter n=113; ■ Diagnostic n=195

NARMS - EB 1997

Veterinary Isolates

Fig. 6. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Turkey



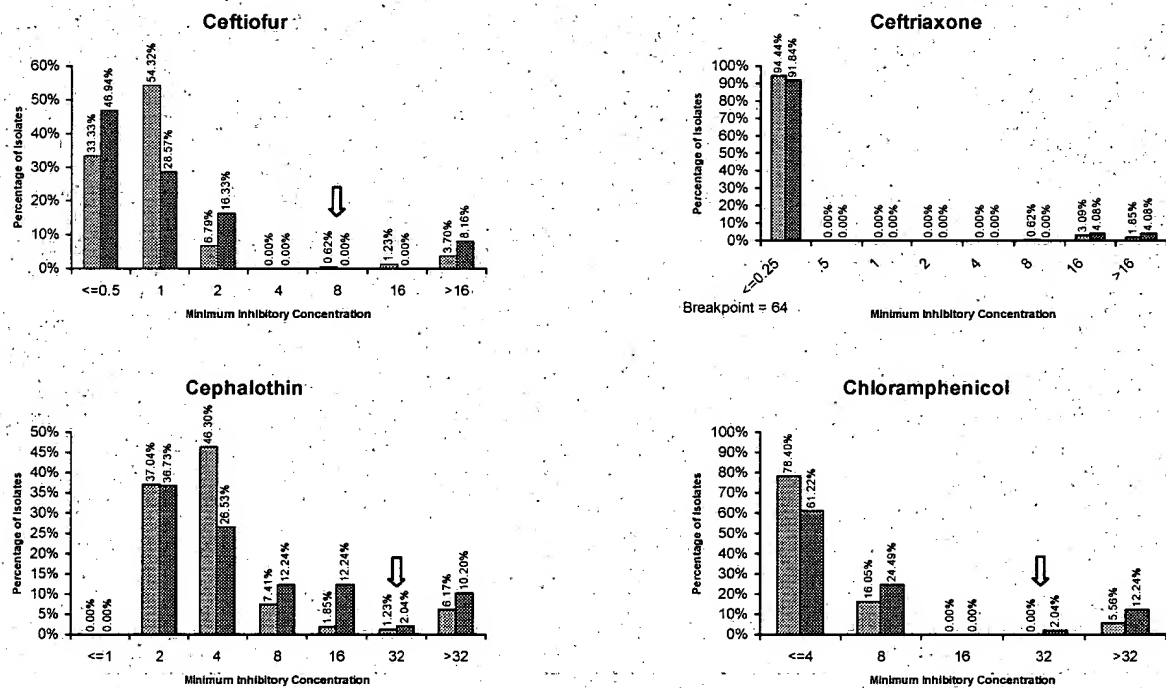
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■ Slaughter n=162; ■ Diagnostic n=49

NARMS - EB 1997

Veterinary Isolates

Fig. 6. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Turkey



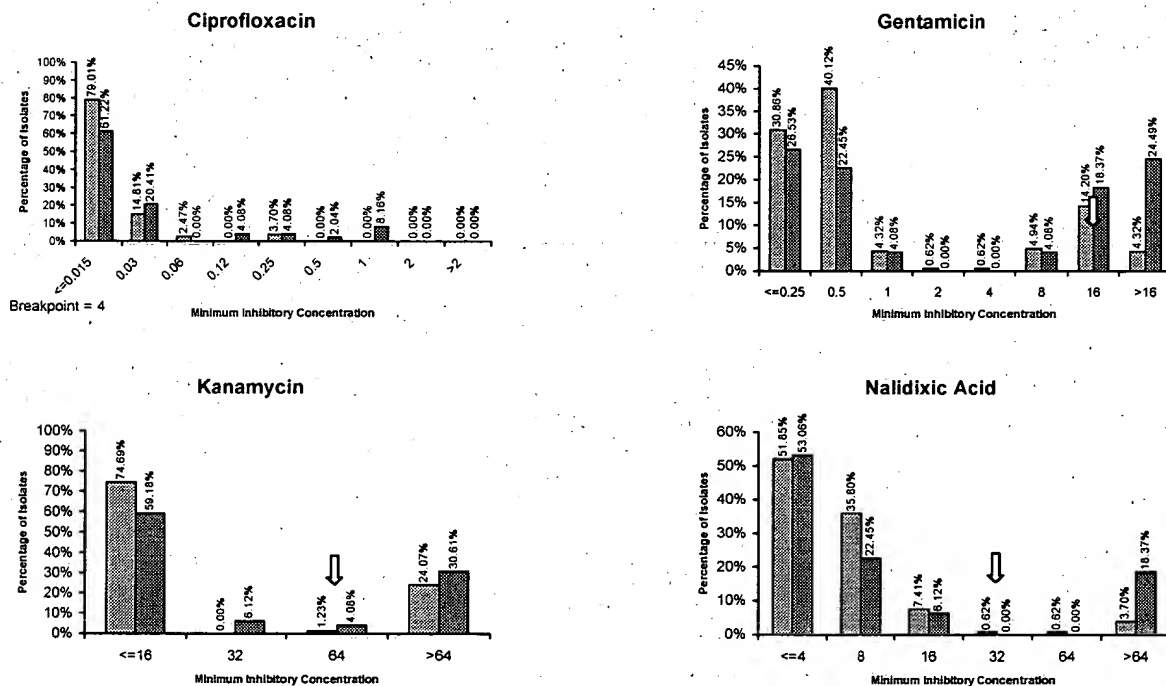
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■ Slaughter n=162; ■ Diagnostic n=49

NARMS - EB 1997

Veterinary Isolates

Fig. 6. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Turkey

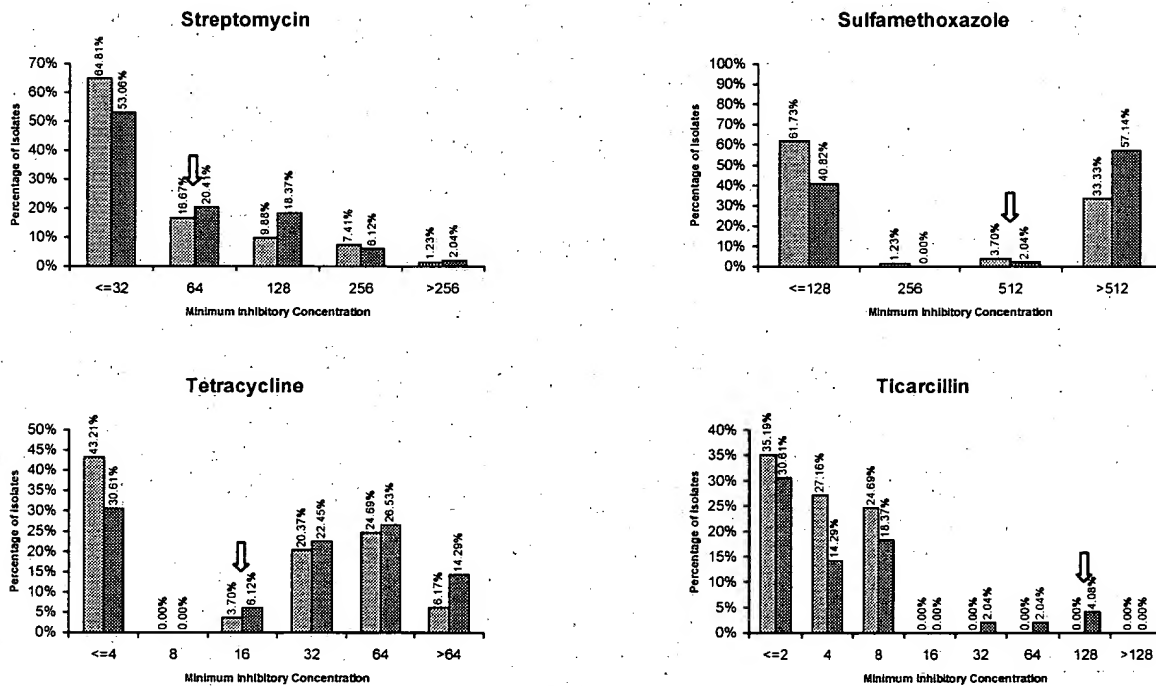


█ Slaughter n=162; █ Diagnostic n=49

NARMS - EB 1997

Veterinary Isolates

Fig. 6. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Turkey



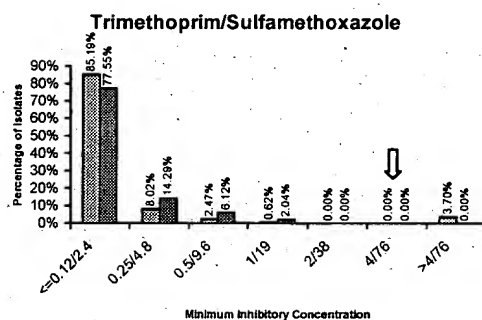
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■ Slaughter n=162; ■ Diagnostic n=49

NARMS - EB 1997

Veterinary Isolates

Fig. 6. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Turkey



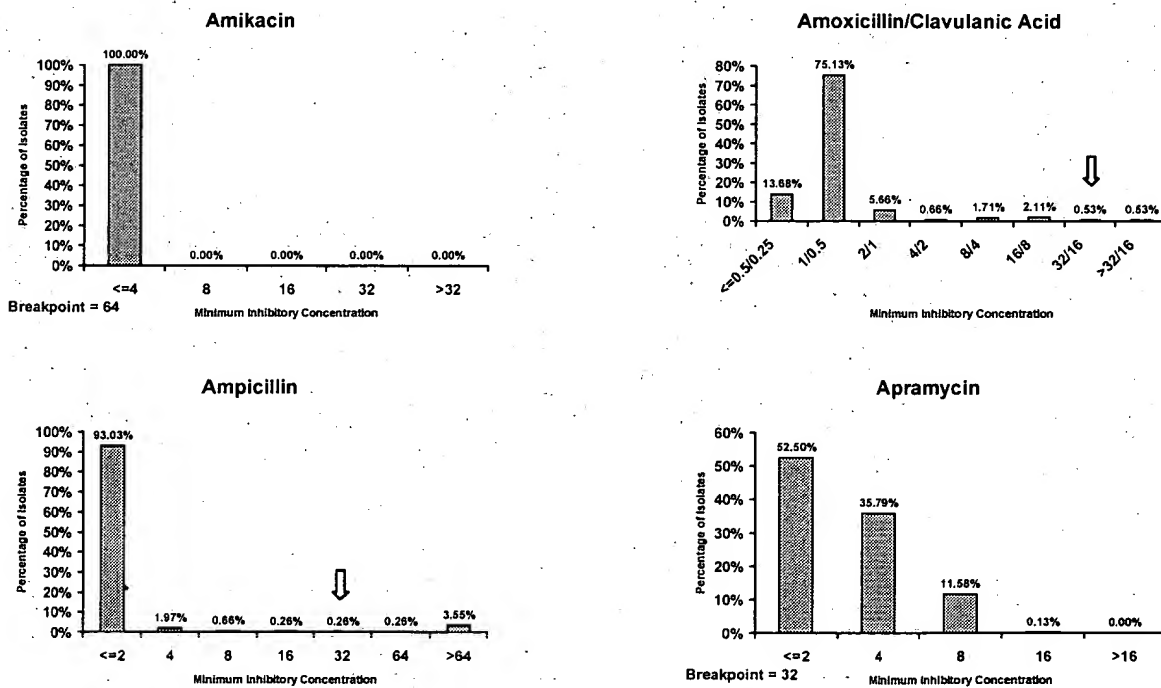
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■ Slaughter n=162; ■ Diagnostic n=49

NARMS - EB 1997

Veterinary Isolates

Fig. 7. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Dairy Cattle



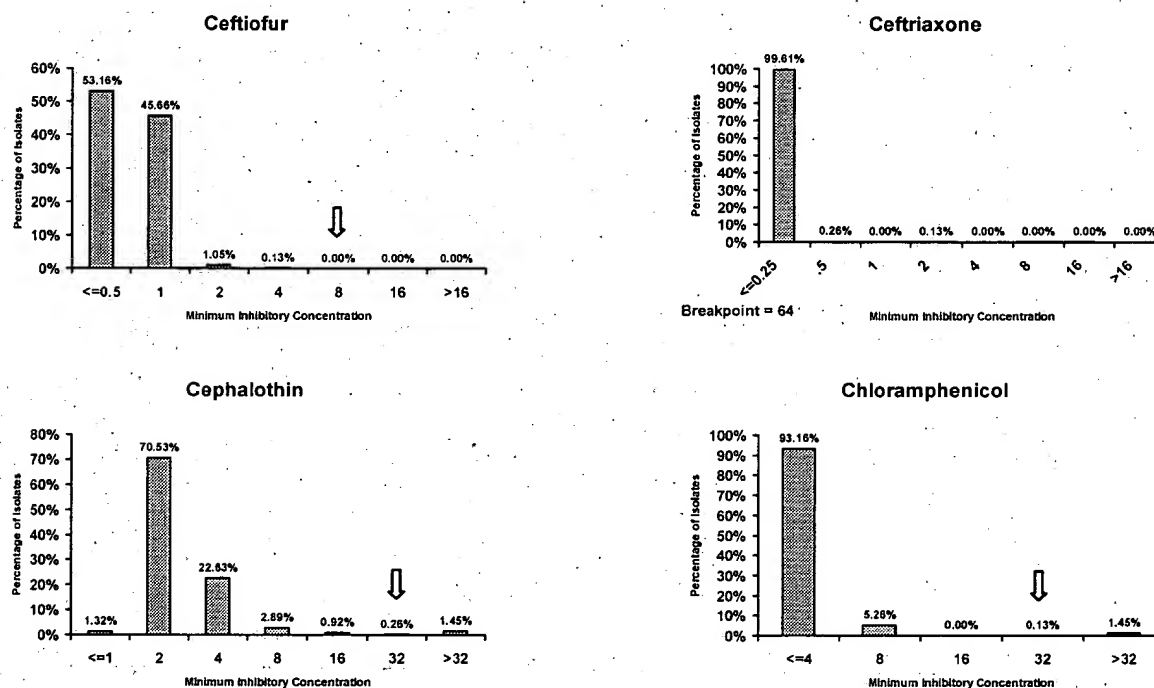
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Non Clinical On-Farm N=760

NARMS - EB 1997

Veterinary Isolates

Fig. 7. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Dairy Cattle



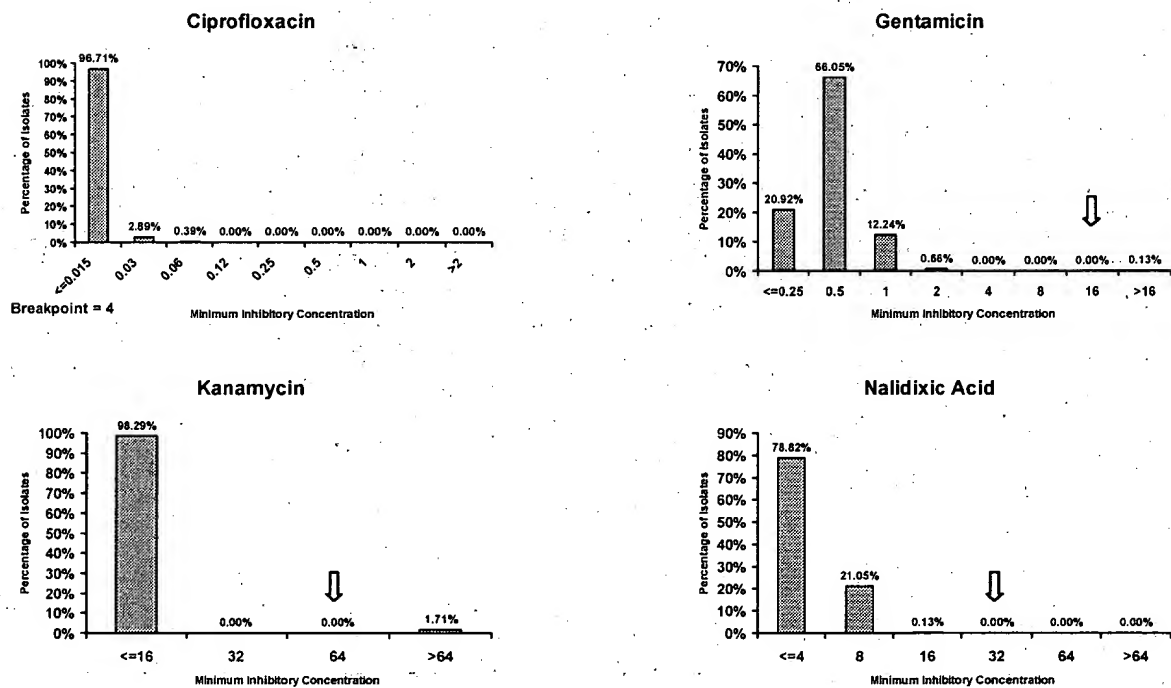
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Non Clinical On-Farm N=760

NARMS - EB 1997

Veterinary Isolates

Fig. 7. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Dairy Cattle



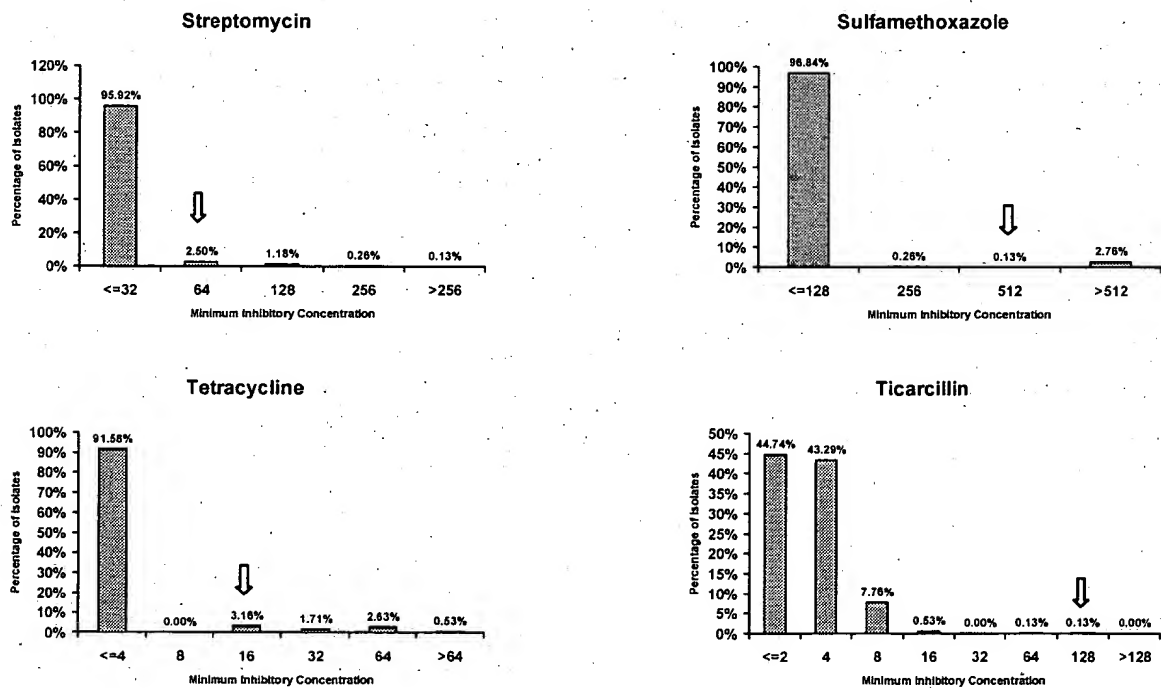
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Non Clinical On-Farm N=760

NARMS - EB 1997

Veterinary Isolates

Fig. 7. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Dairy Cattle



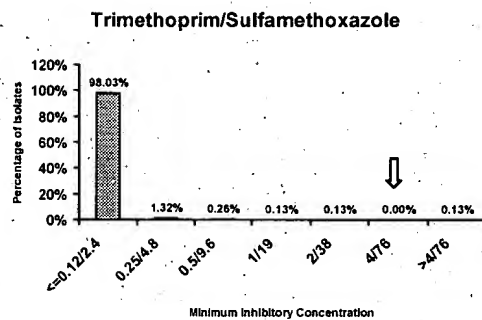
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Non Clinical On-Farm N=760

NARMS - EB 1997

Veterinary Isolates

Fig. 7. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Dairy Cattle



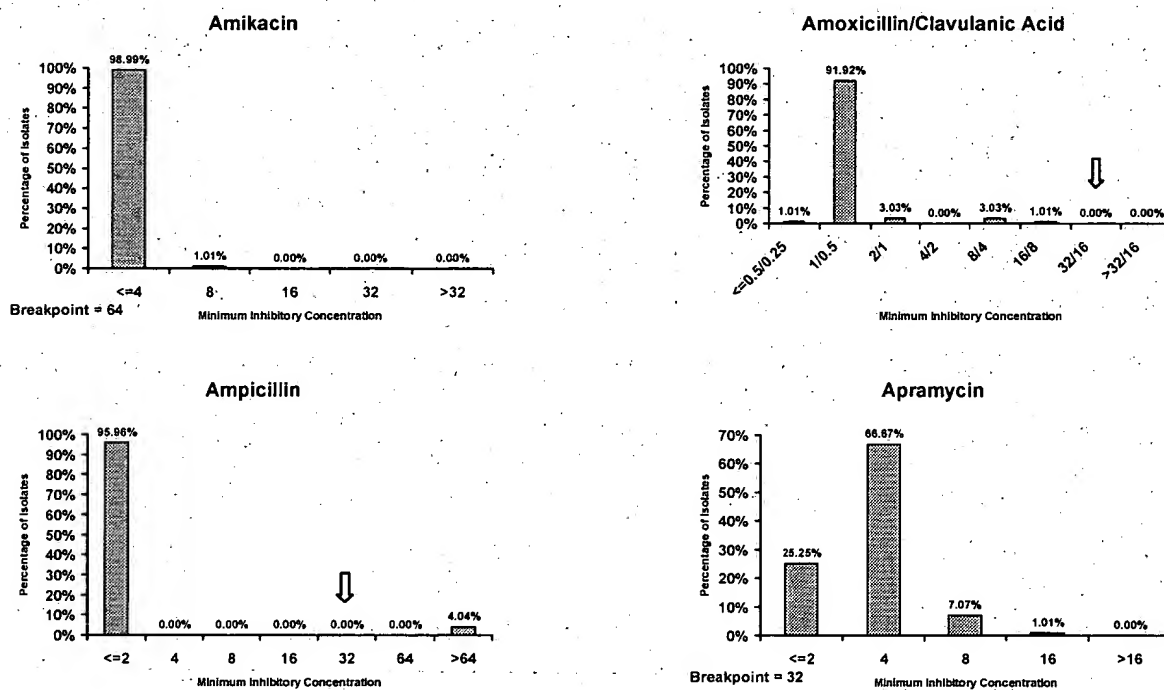
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Non Clinical On-Farm N=760

NARMS - EB 1997

Veterinary Isolates

Fig. 8. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Cull Dairy Cattle



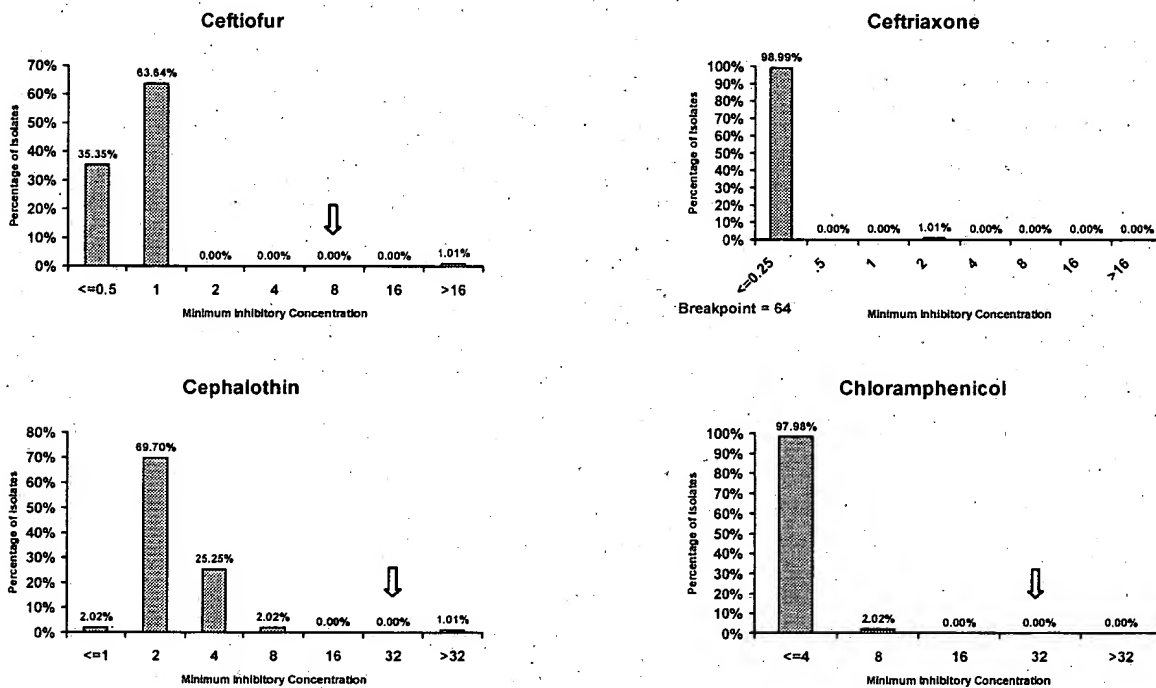
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Non-Clinical Cull N=99

NARMS - EB 1997

Veterinary Isolates

Fig. 8. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Cull Dairy Cattle



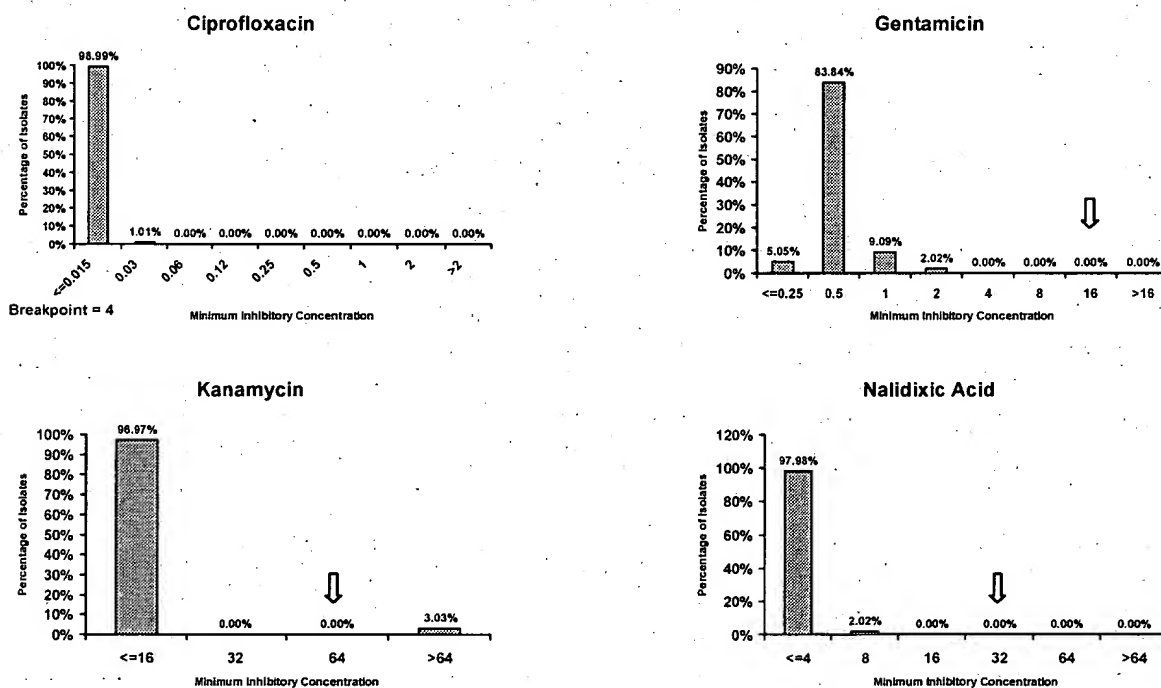
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Non-Clinical Cull N=99

NARMS - EB 1997

Veterinary Isolates

Fig. 8. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Cull Dairy Cattle



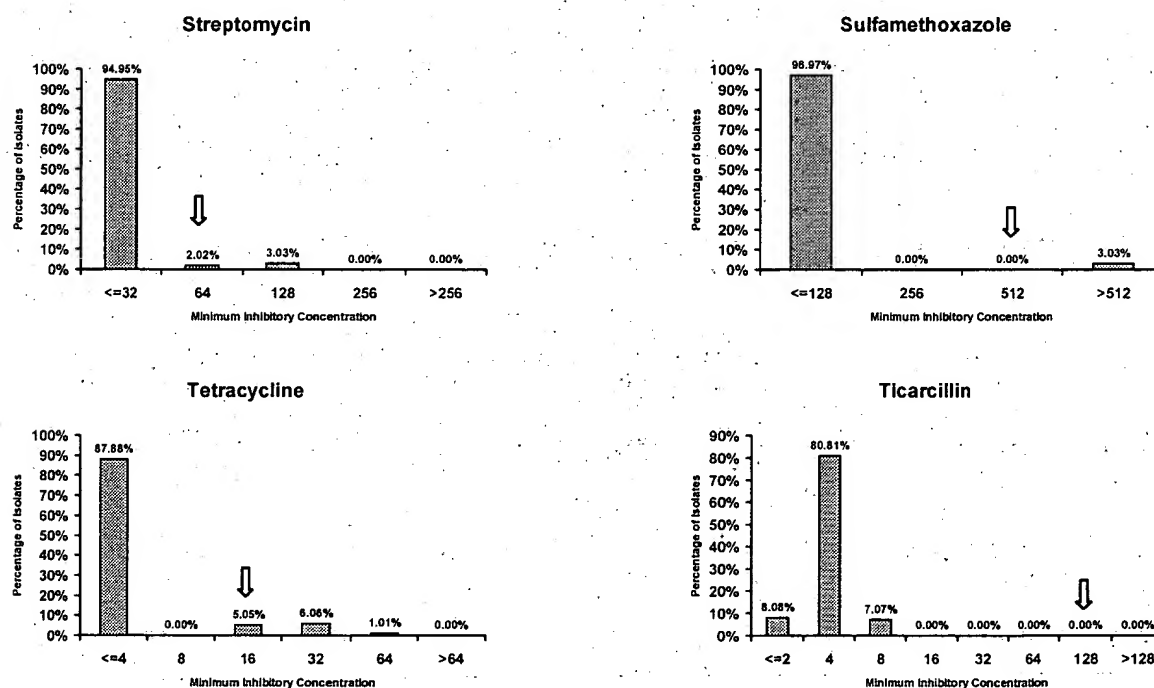
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Non-Clinical Cull N=99

NARMS - EB 1997

Veterinary Isolates

Fig. 8. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Cull Dairy Cattle



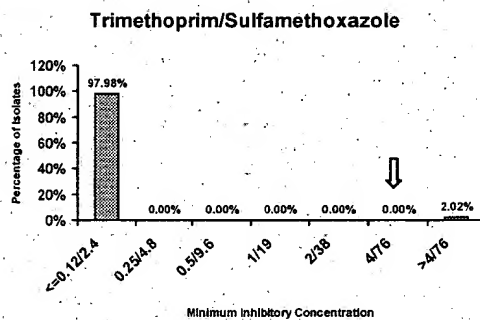
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Non-Clinical Cull N=99

NARMS - EB 1997

Veterinary Isolates

Fig. 8. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Cull Dairy Cattle



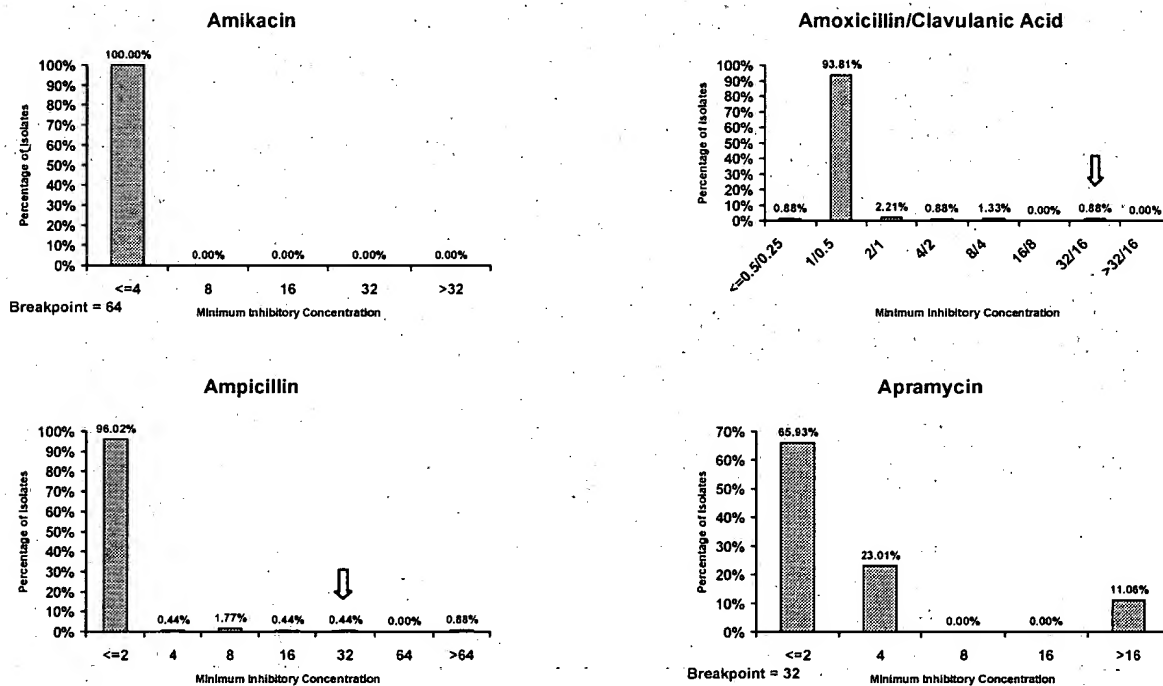
⇓ Breakpoint

Non-Clinical Cull N=99

NARMS - EB 1997

Veterinary Isolates

Fig. 9. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Swine



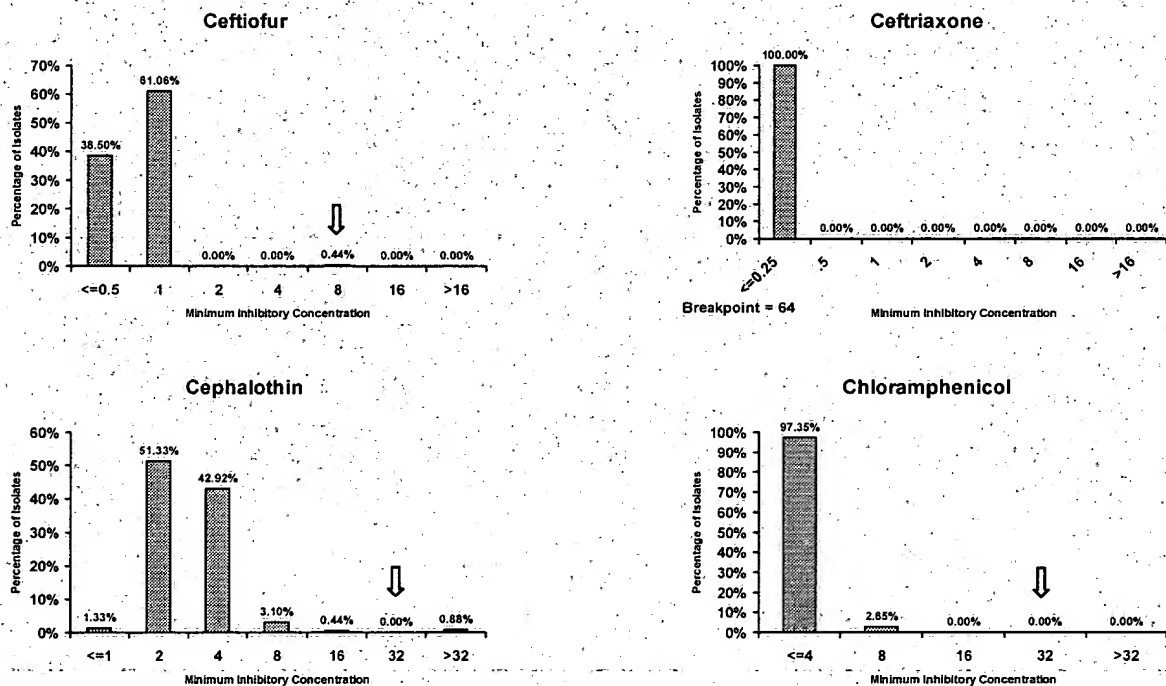
↓ Breakpoint

Non Clinical On-Farm N=226

NARMS - EB 1997

Veterinary Isolates

Fig. 9. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Swine



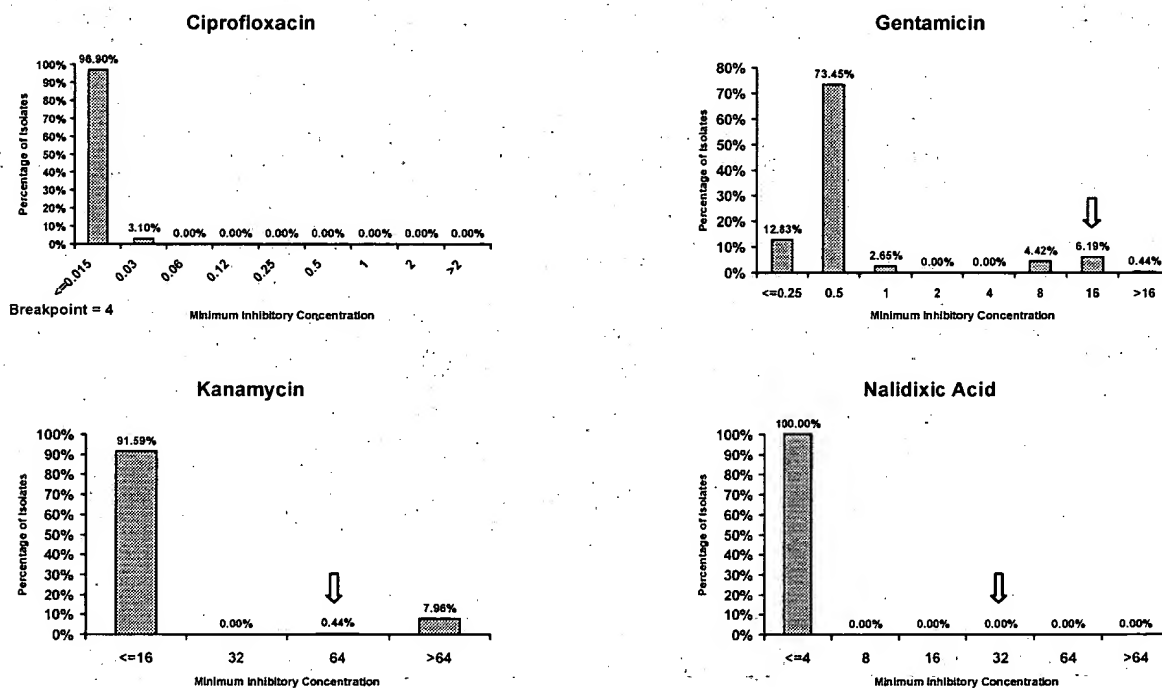
↓ Breakpoint

Non-Clinical On-Farm N=226

NARMS - EB 1997

Veterinary Isolates

Fig. 9. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Swine



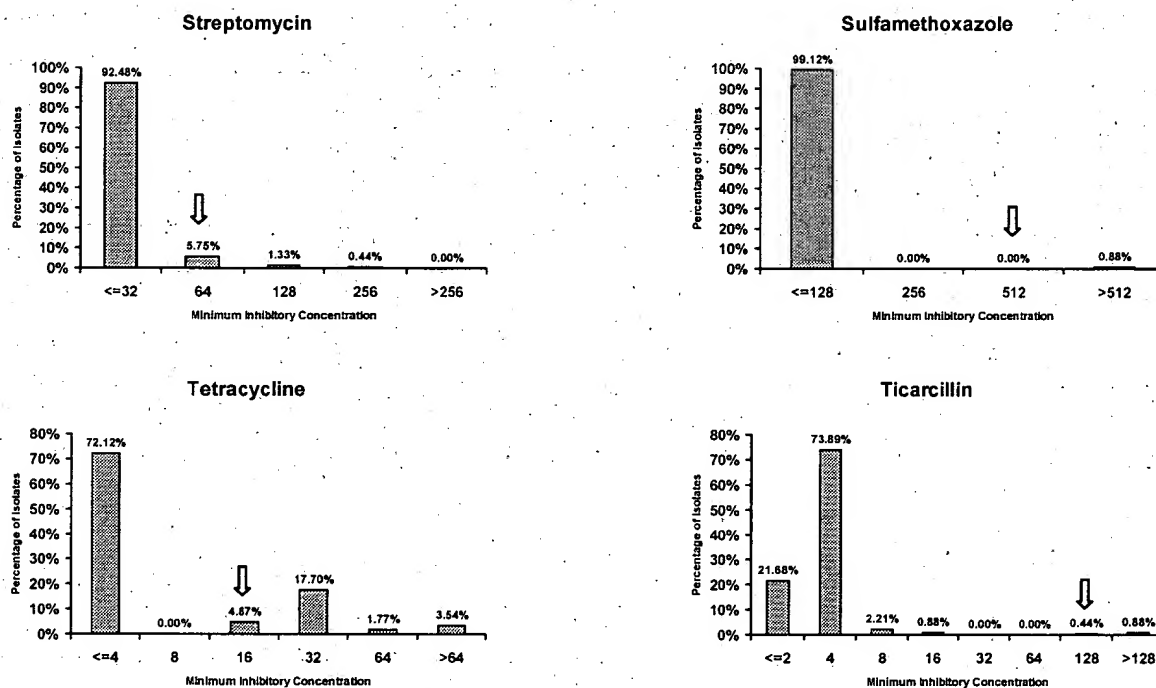
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Non Clinical On-Farm N=226

NARMS - EB 1997

Veterinary Isolates

Fig. 9. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Swine



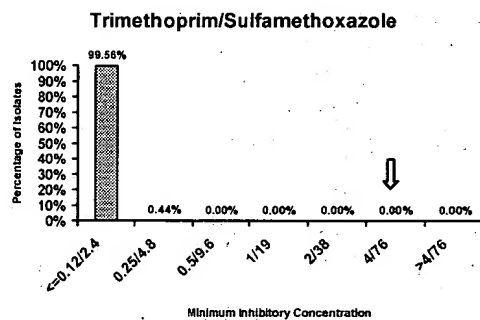
↓ Breakpoint

Non Clinical On-Farm N=226

NARMS - EB 1997

Veterinary Isolates

Fig. 9. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Swine



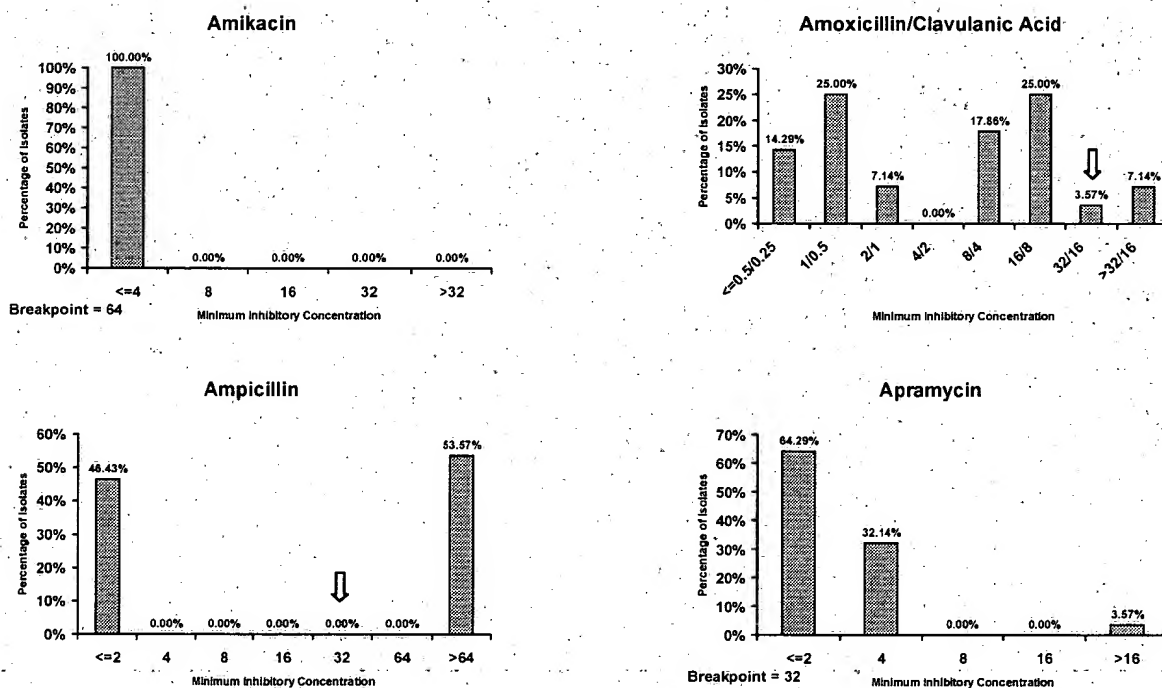
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Non Clinical On-Farm N=226

NARMS - EB 1997

Veterinary Isolates

Fig. 10. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Cats



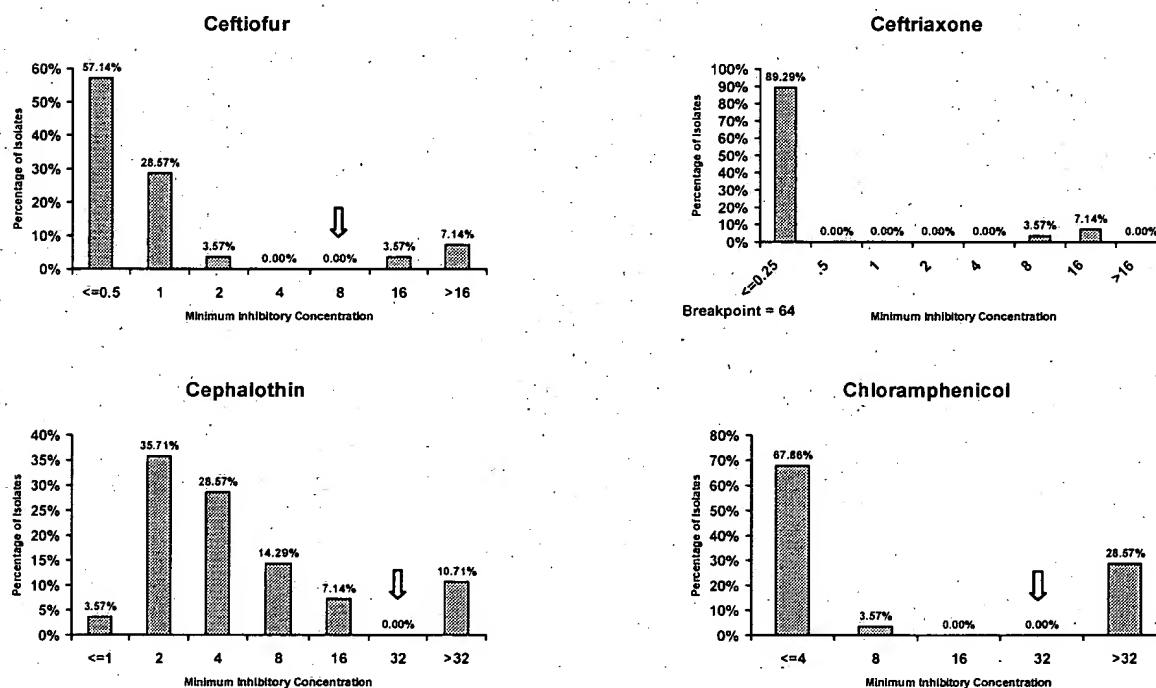
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Diagnostic n=28

NARMS - EB 1997

Veterinary Isolates

Fig. 10. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Cats



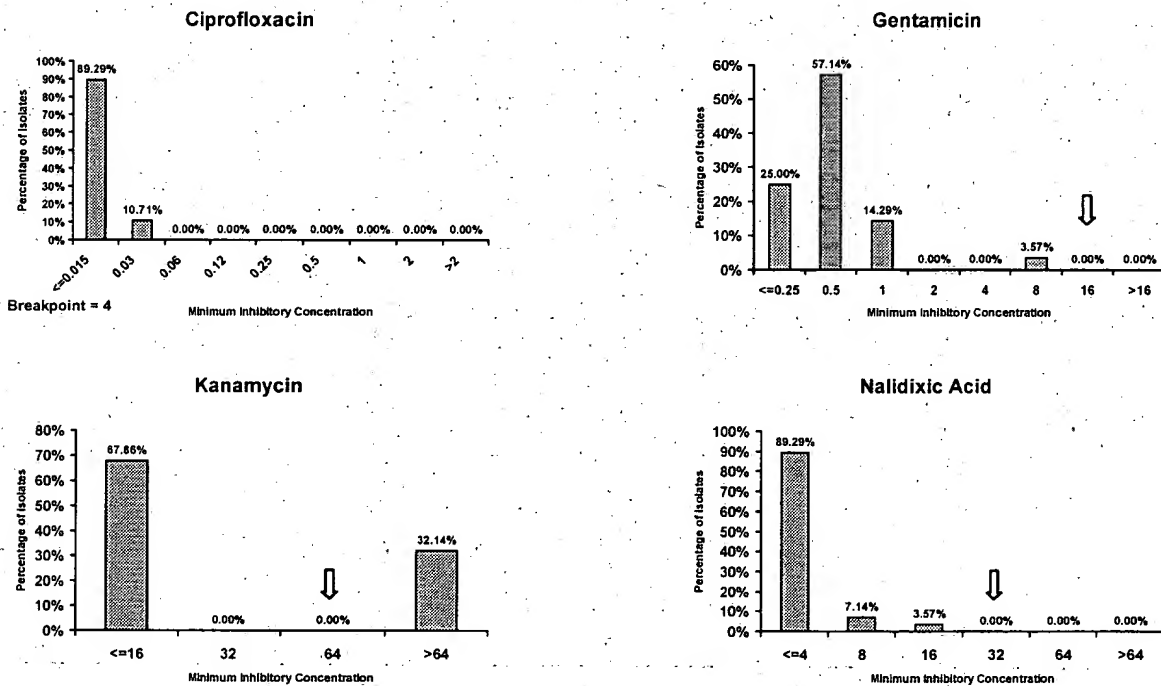
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Diagnostic n=28

NARMS - EB 1997

Veterinary Isolates

Fig. 10. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Cats



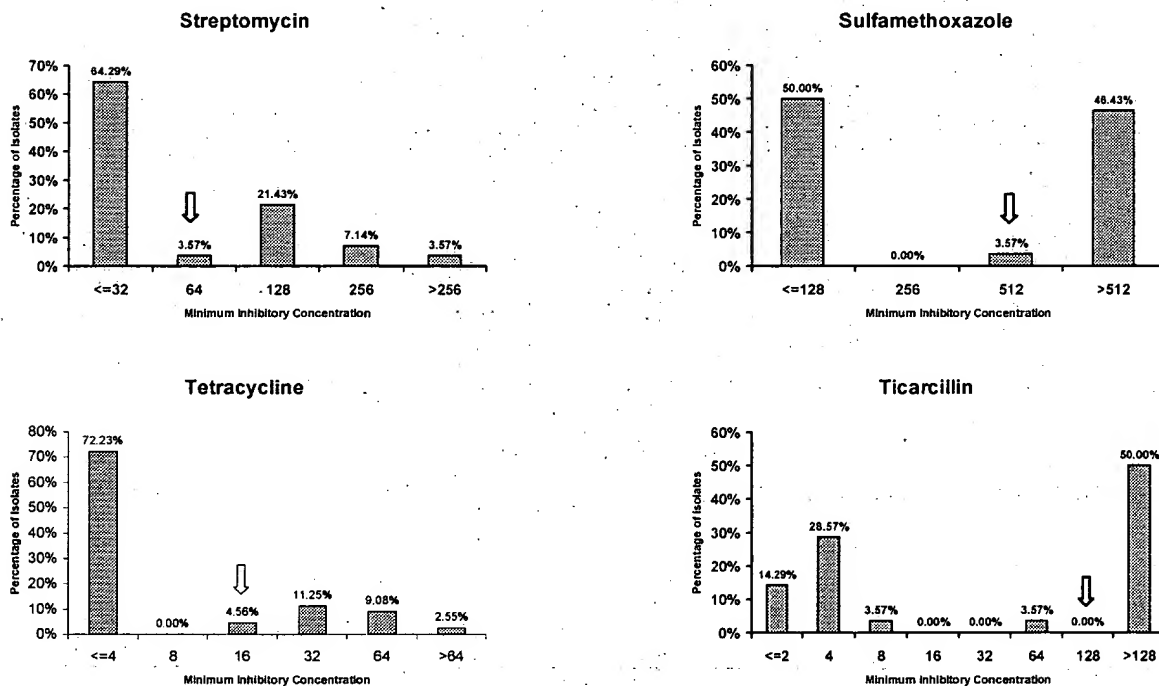
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Diagnostic n=28

NARMS - EB 1997

Veterinary Isolates

Fig. 10. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Cats



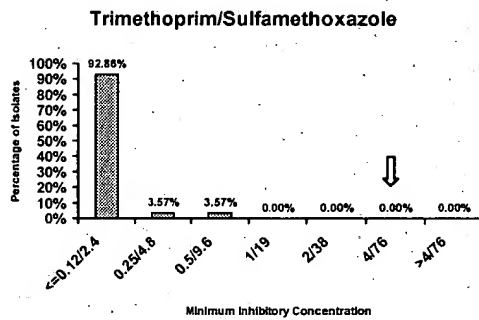
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Diagnostic n=28

NARMS - EB 1997

Veterinary Isolates

Fig. 10. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Cats



↓ Breakpoint

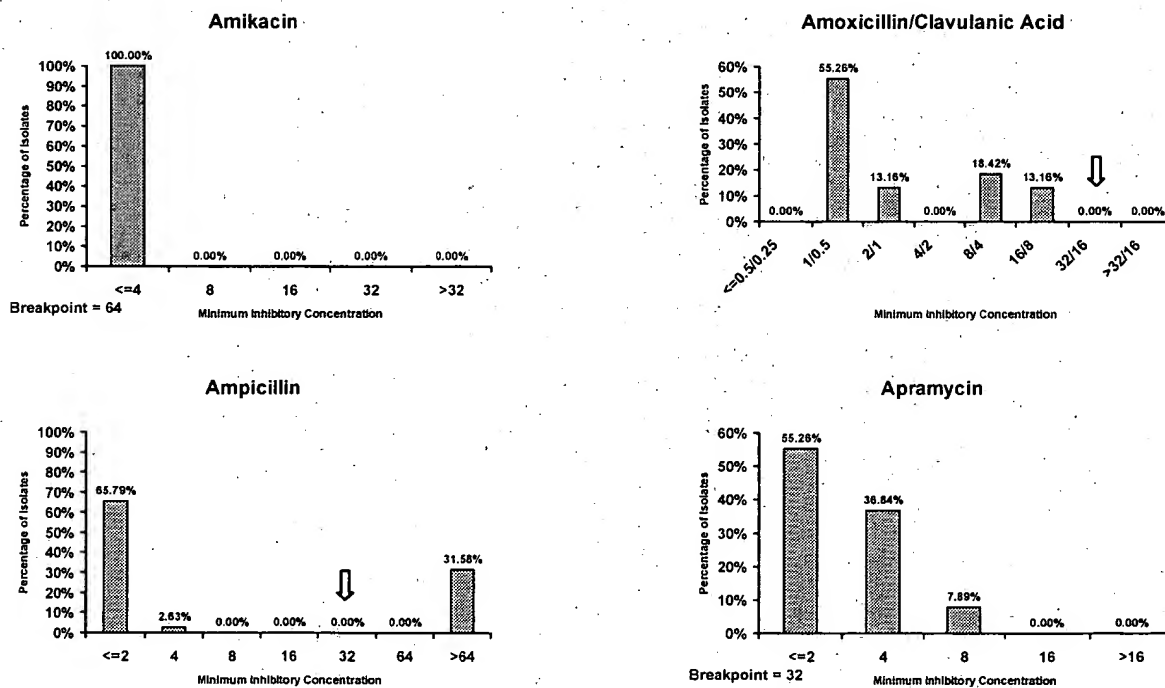
Diagnostic n=28

88

NARMS - EB 1997

Veterinary Isolates

Fig. 11. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Dogs



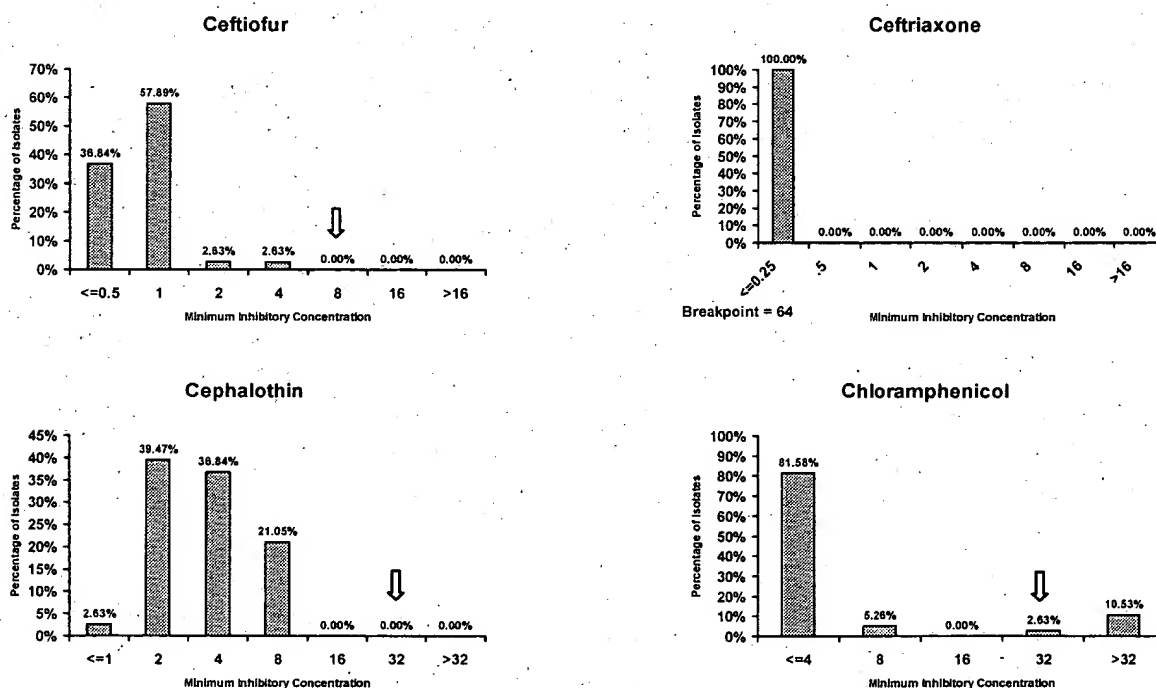
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Diagnostic n=38

NARMS - EB 1997

Veterinary Isolates

Fig. 11. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Dogs



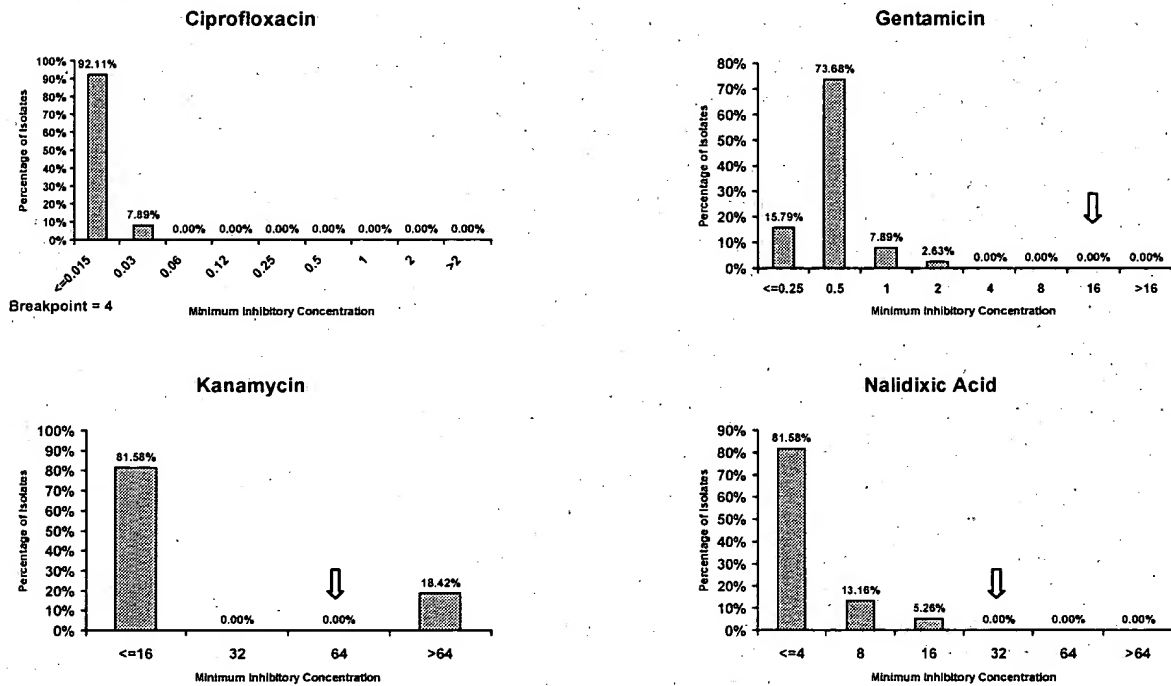
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Diagnostic n=38

NARMS - EB 1997

Veterinary Isolates

Fig. 11. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Dogs



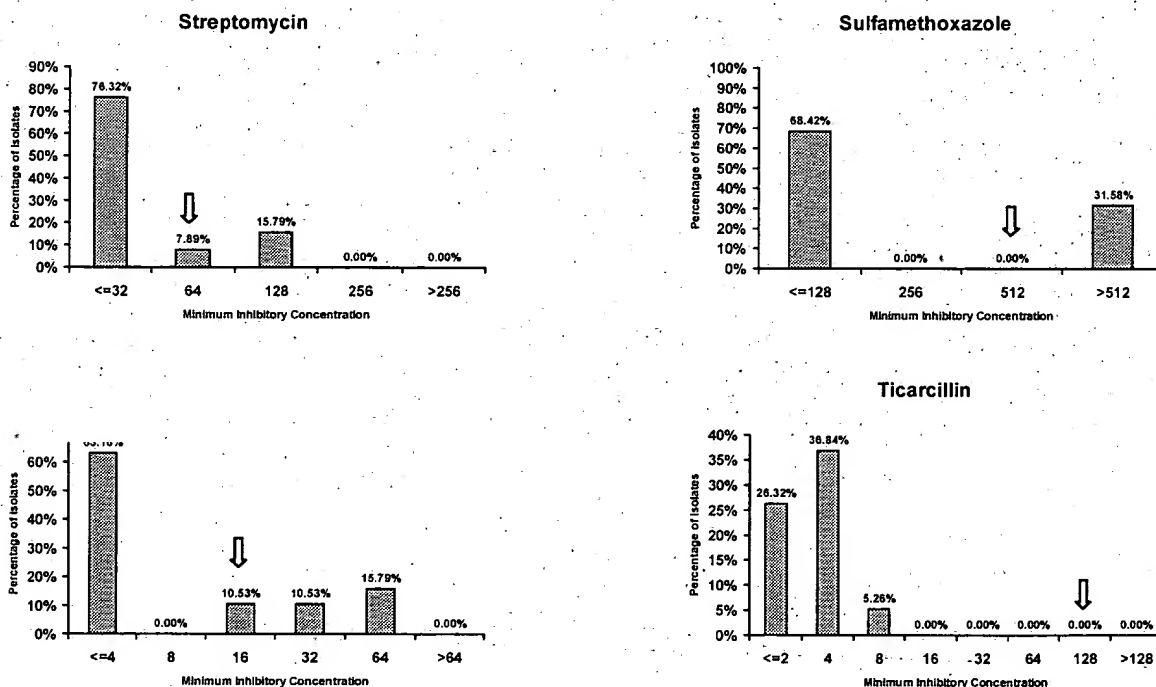
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Diagnostic n=38

NARMS - EB 1997

Veterinary Isolates

Fig. 11. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Dogs



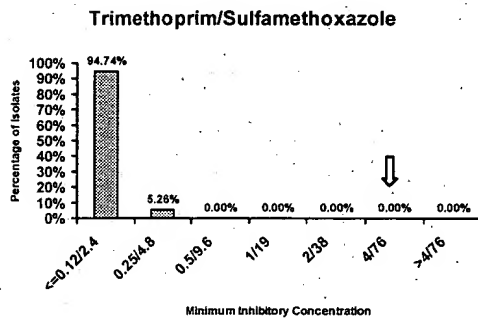
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Diagnostic n=38

NARMS - EB 1997

Veterinary Isolates

Fig. 11. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Dogs



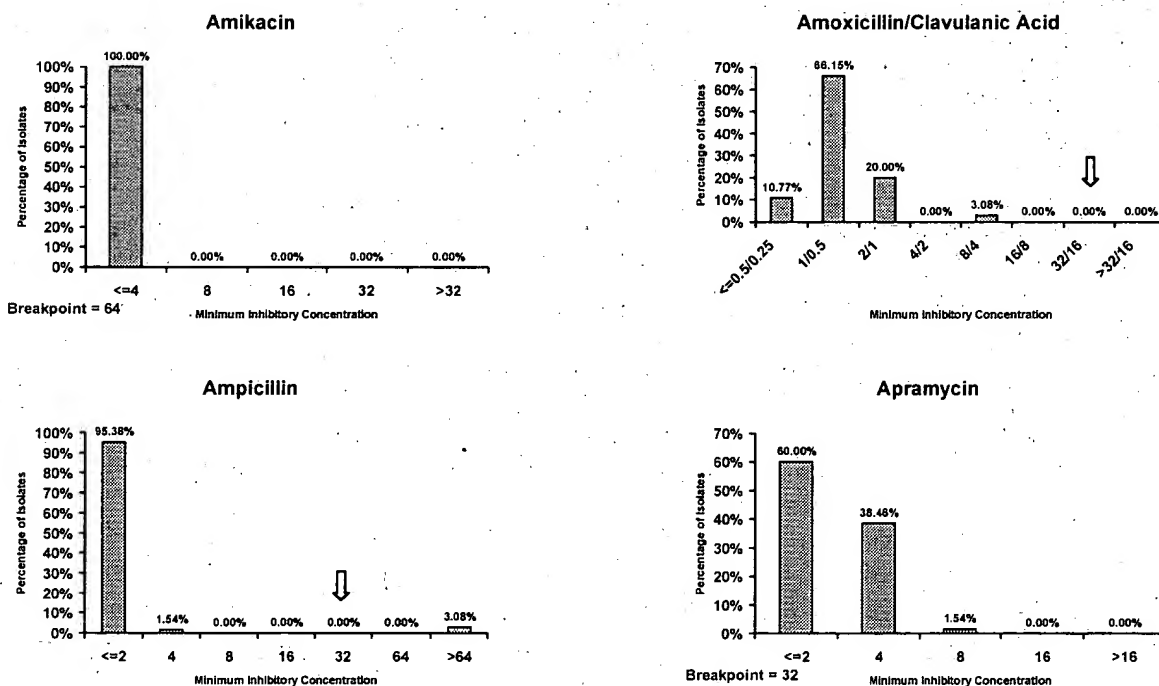
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Diagnostic n=38

NARMS - EB 1997

Veterinary Isolates

Fig. 12. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Exotics



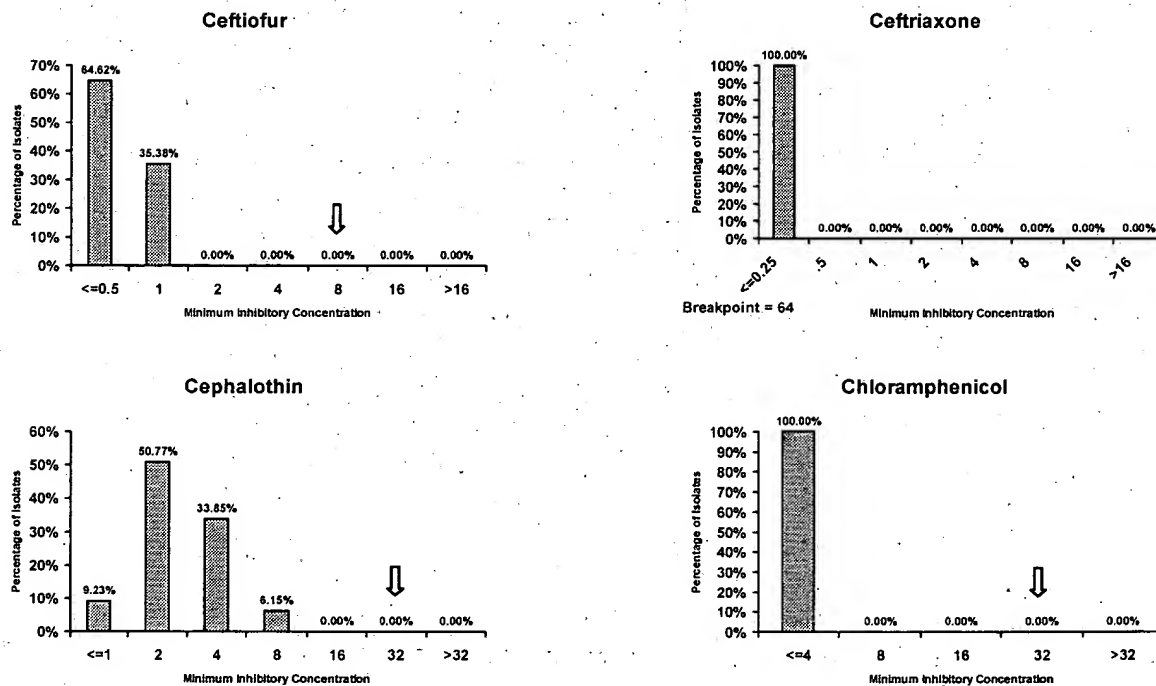
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Diagnostic n=65

NARMS - EB 1997

Veterinary Isolates

Fig. 12. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Exotics



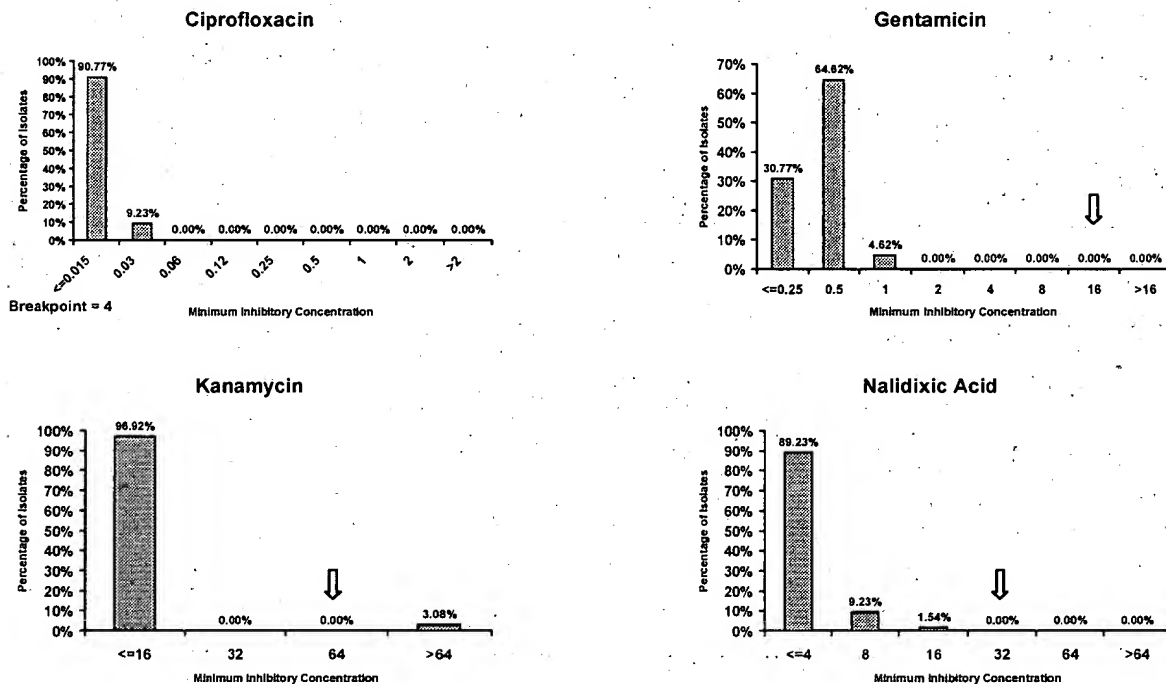
↓ Breakpoint

Diagnostic n=65

NARMS - EB 1997

Veterinary Isolates

Fig. 12. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Exotics



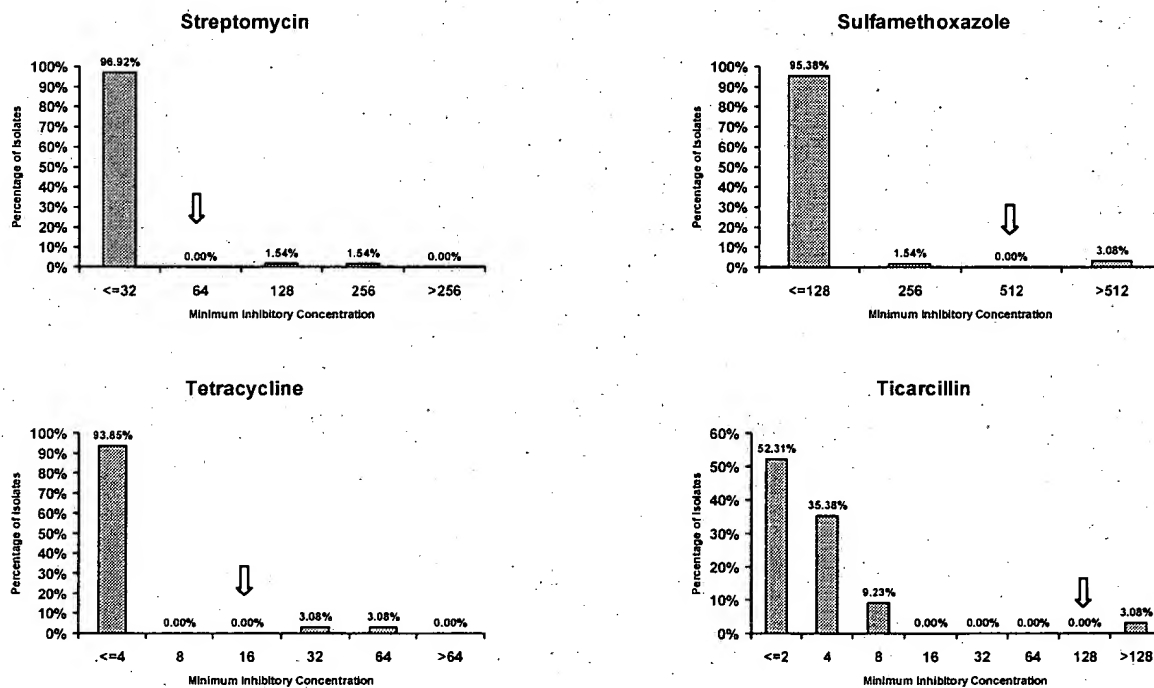
↓ Breakpoint

Diagnostic n=65

NARMS - EB 1997

Veterinary Isolates

Fig. 12. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Exotics



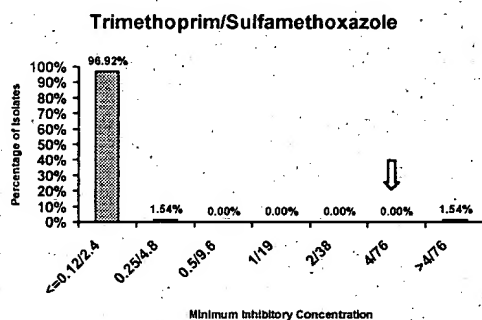
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Diagnostic n=65

NARMS - EB 1997

Veterinary Isolates

Fig. 12. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Exotics



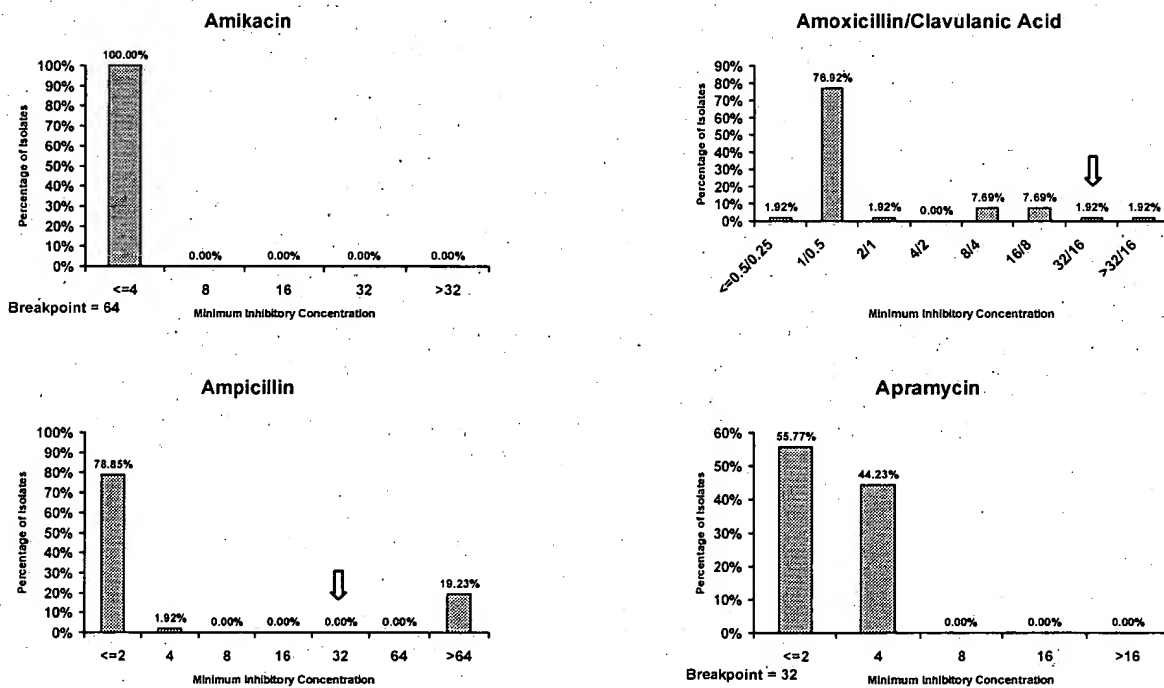
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Diagnostic n=65

NARMS - EB 1997

Veterinary Isolates

Fig. 13. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Horses



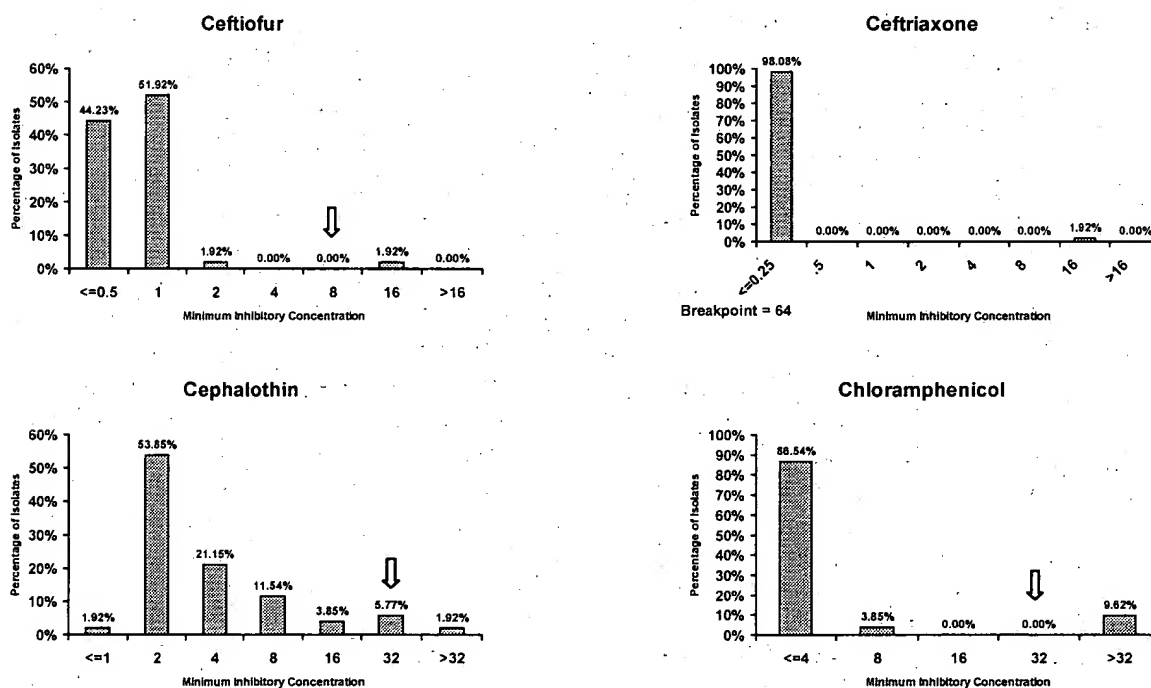
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Diagnostic n=52

NARMS - EB 1997

Veterinary Isolates

Fig. 13. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Horses



↓ Breakpoint

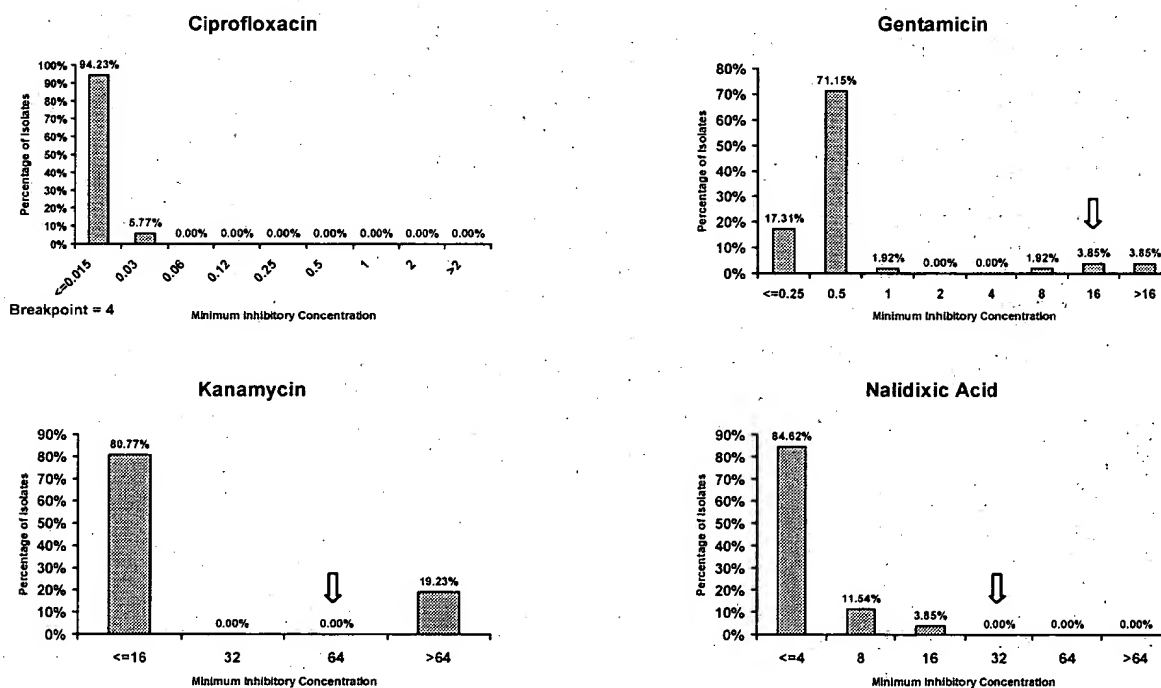
Diagnostic n=52

100

NARMS - EB 1997

Veterinary Isolates

Fig. 13. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Horses



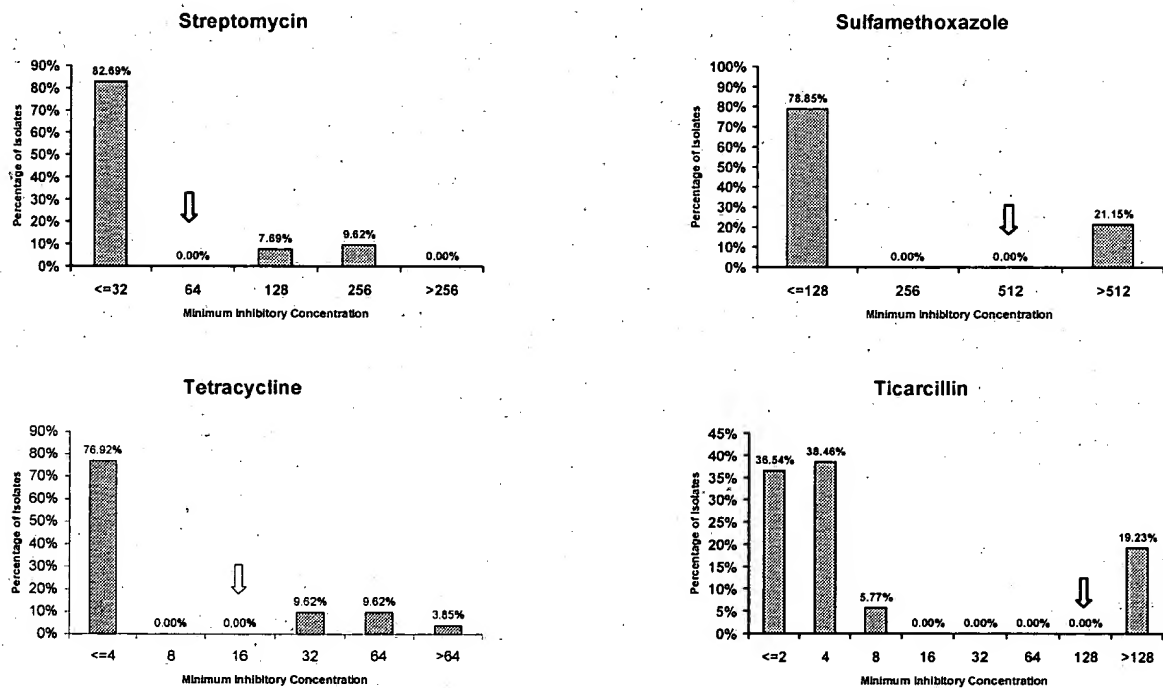
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Diagnostic n=52

NARMS - EB 1997

Veterinary Isolates

Fig. 13. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Horses



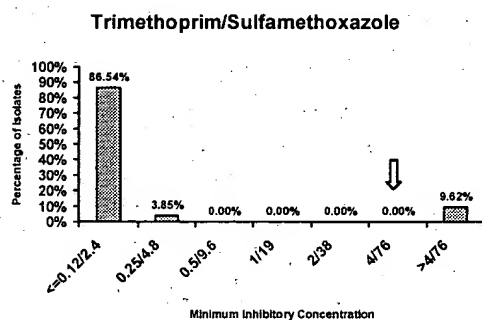
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Diagnostic n=52

NARMS - EB 1997

Veterinary Isolates

Fig. 13. Minimum Inhibitory Concentrations by Antimicrobial Agent for Salmonella Isolates from Horses



↓ Breakpoint

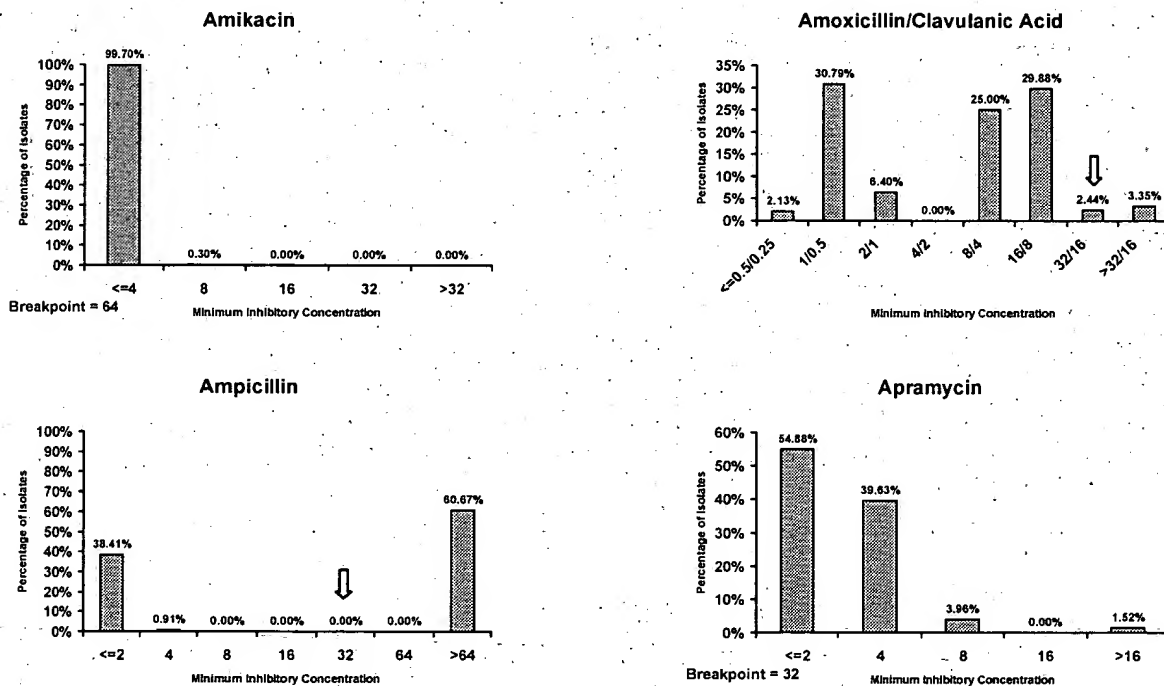
Diagnostic n=52

103

NARMS - EB 1997

Veterinary Isolates

Fig. 14. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. typhimurium* (including copenhagen) from All Species



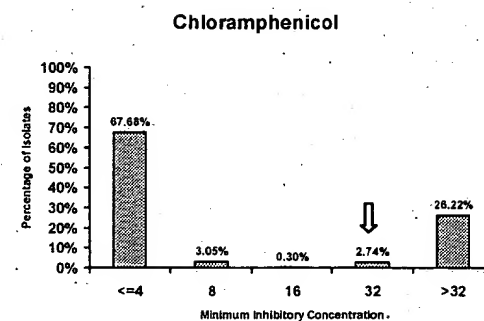
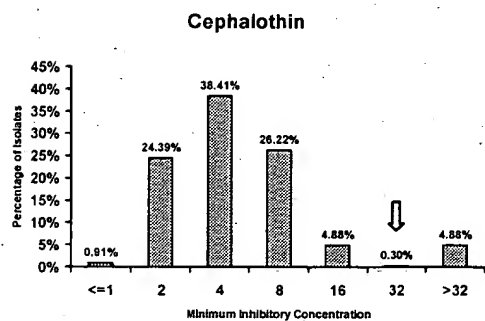
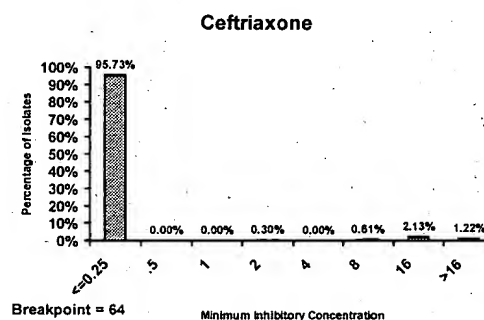
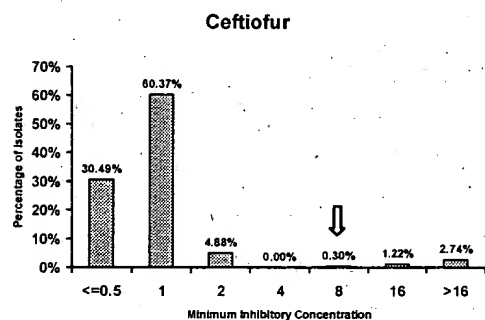
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n=328

NARMS - EB 1997

Veterinary Isolates

Fig. 14. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. typhimurium* (including copenhagen) from All Species



↓ Breakpoint

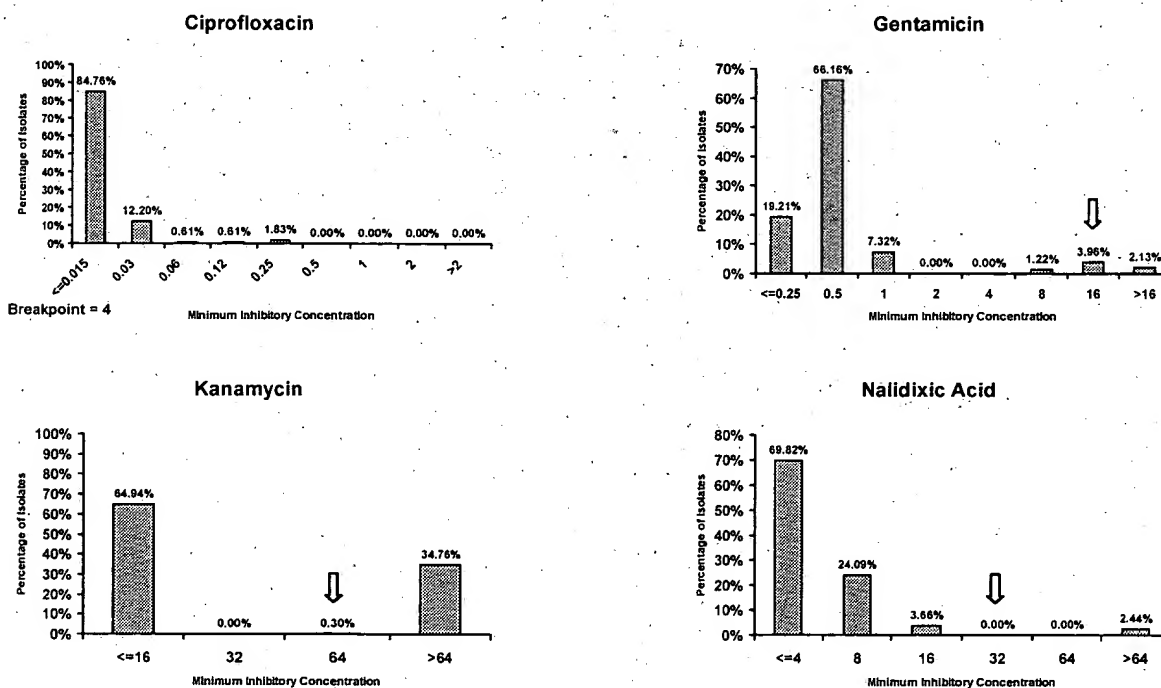
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105

NARMS - EB 1997

Veterinary Isolates

Fig. 14. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. typhimurium* (including copenhagen) from All Species



↓ Breakpoint

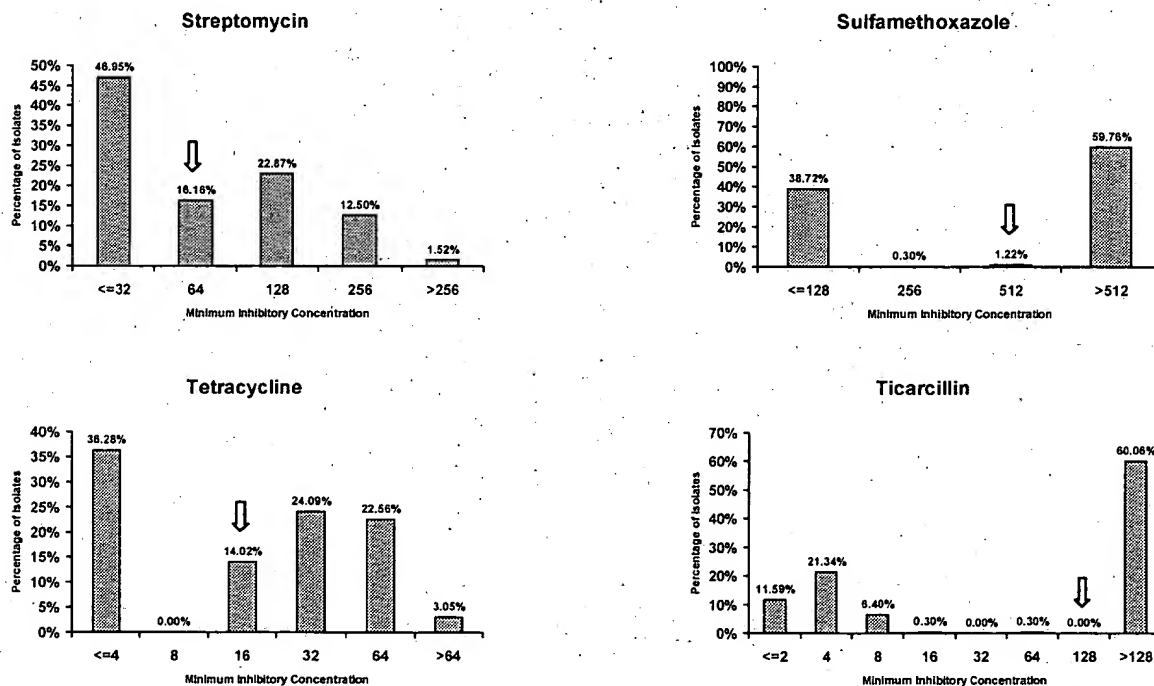
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106

NARMS - EB 1997

Veterinary Isolates

Fig. 14. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. typhimurium* (including copenhagen) from All Species



↓ Breakpoint

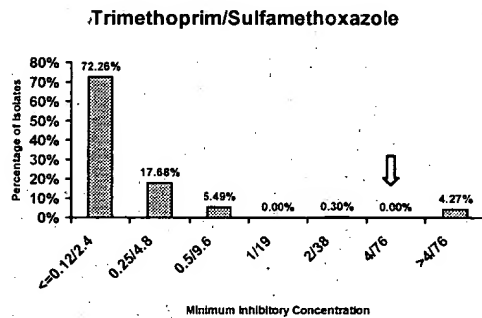
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107

NARMS - EB 1997

Veterinary Isolates

Fig. 14. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. typhimurium* (including copenhagen) from All Species



↓ Breakpoint

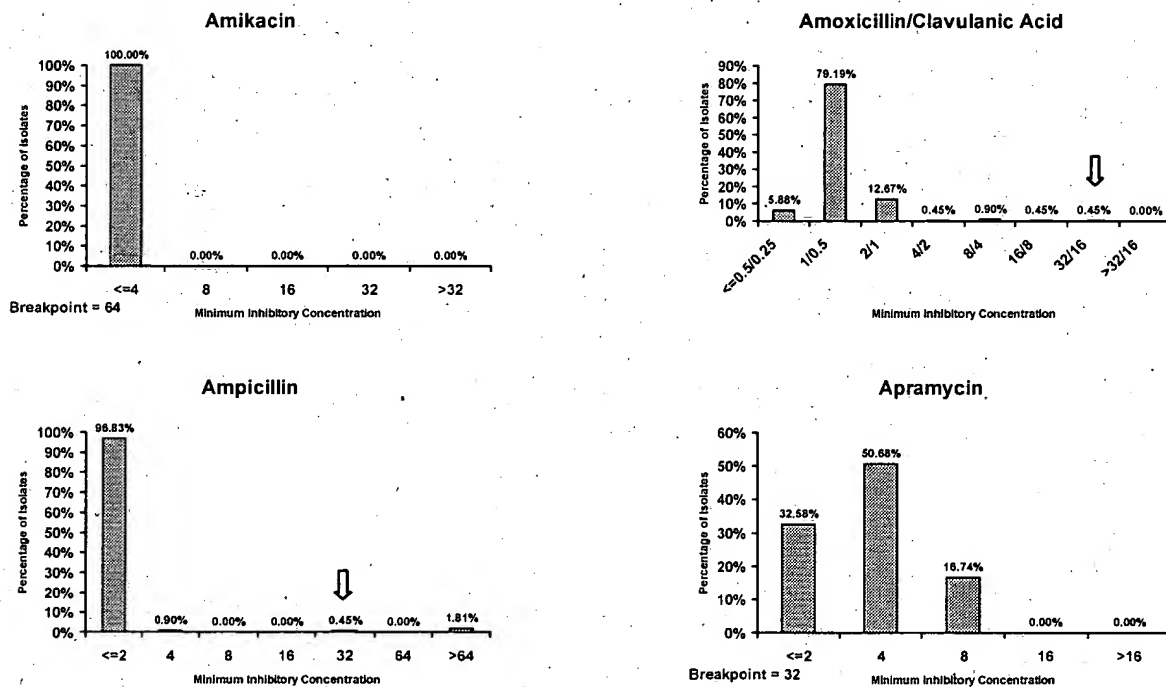
n=328

108

NARMS - EB 1997

Veterinary Isolates

Fig. 15. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. montevideo* from All Species



↓ Breakpoint

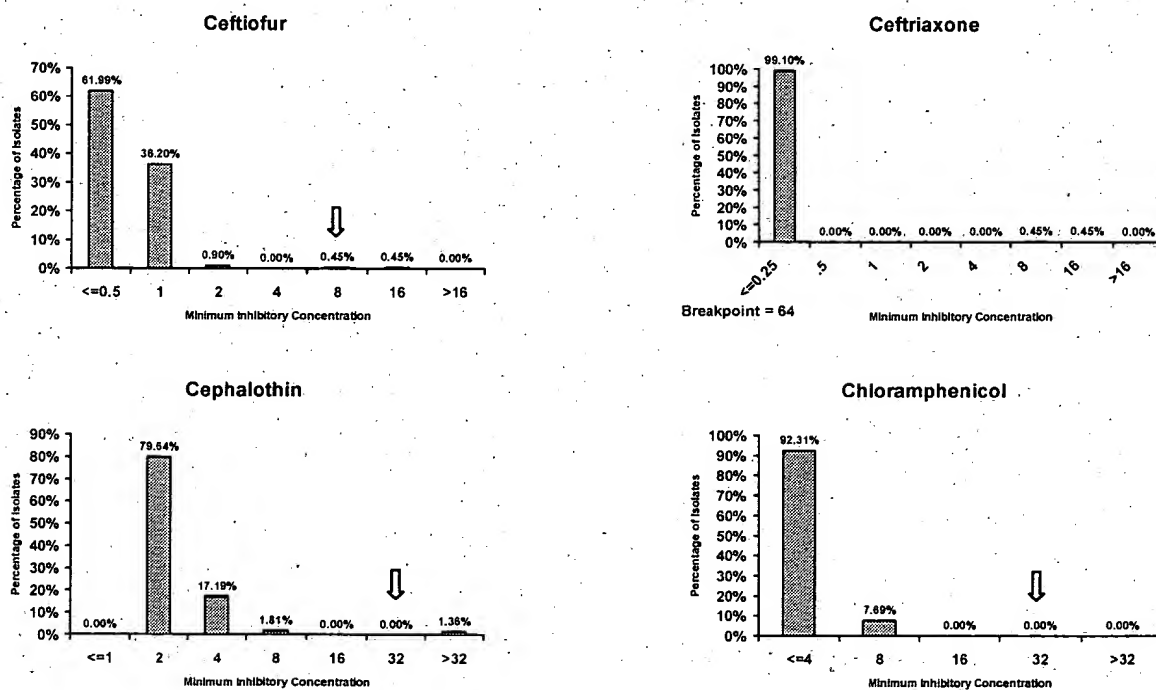
n=221

109

NARMS - EB 1997

Veterinary Isolates

Fig. 15. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. montevideo* from All Species



↓ Breakpoint

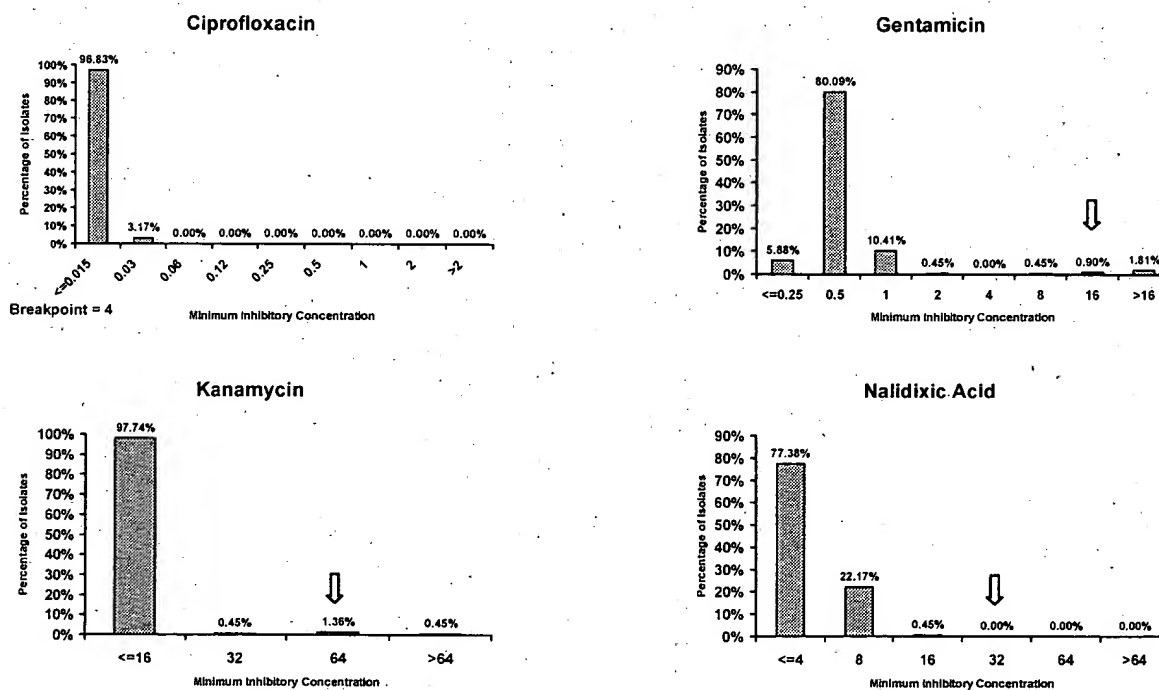
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110

NARMS - EB 1997

Veterinary Isolates

Fig. 15. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. montevideo* from All Species



↓ Breakpoint

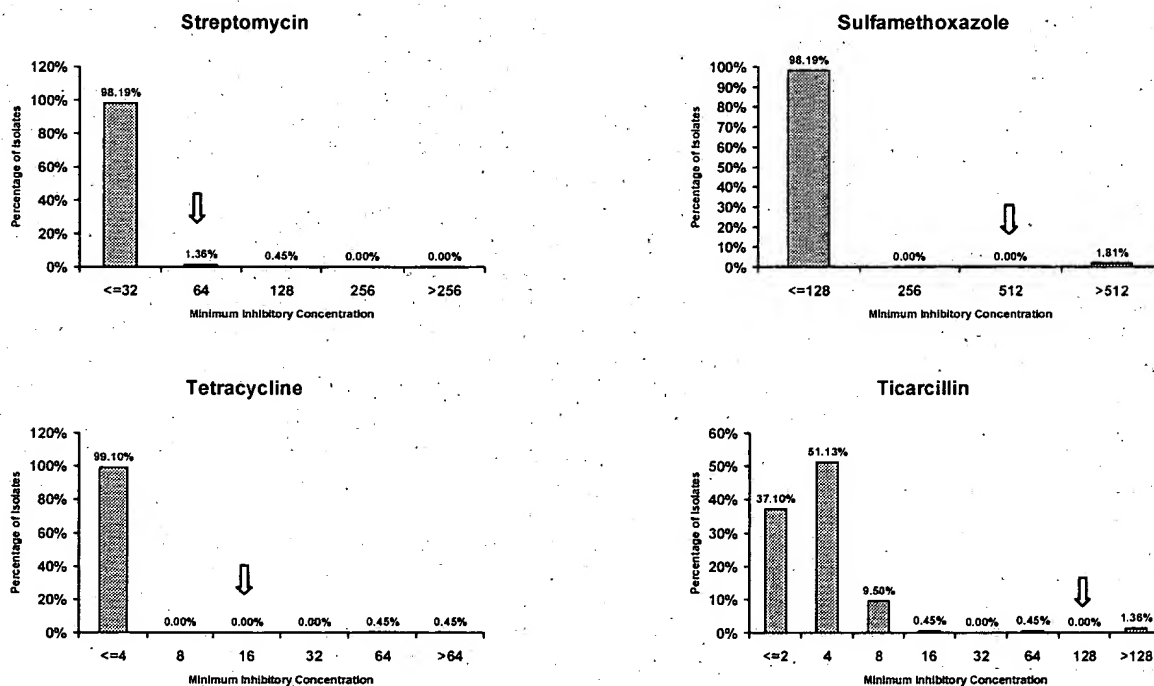
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111

NARMS - EB 1997

Veterinary Isolates

Fig. 15. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. montevideo* from All Species



↓ Breakpoint

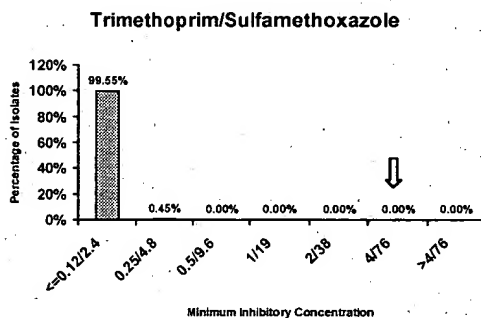
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112

NARMS - EB 1997

Veterinary Isolates

Fig. 15. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. montevideo* from All Species



↓ Breakpoint

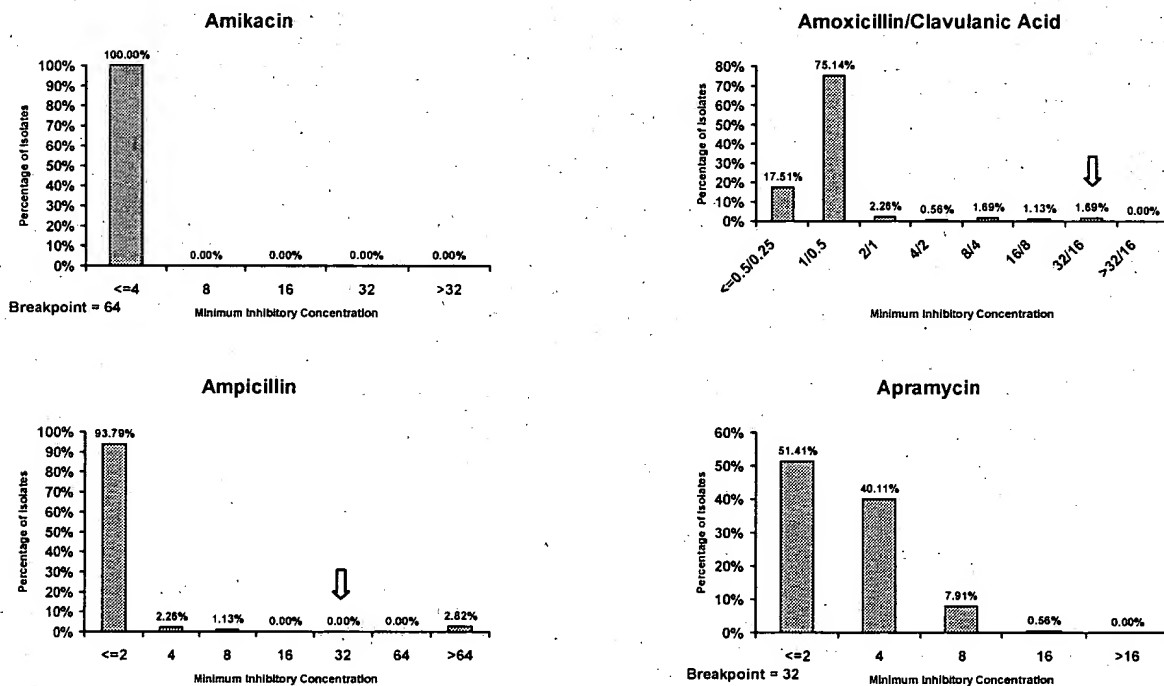
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113

NARMS - EB 1997

Veterinary Isolates

Fig. 16. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. kentucky* from All Species



↓ Breakpoint

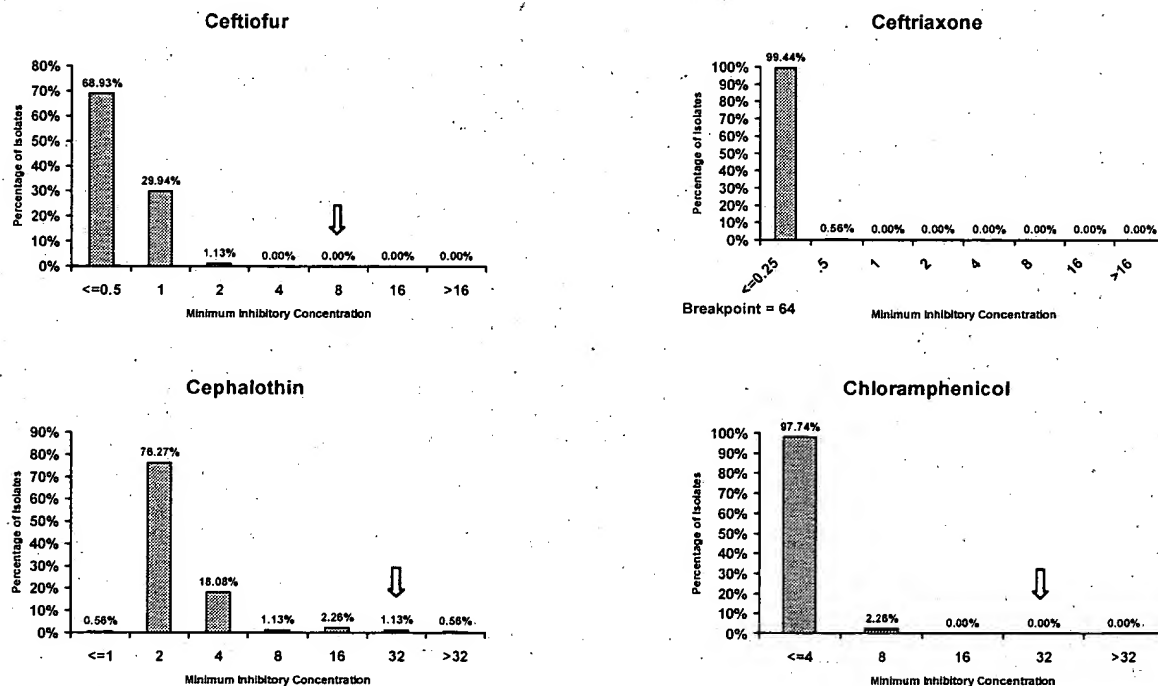
n=177

114

NARMS - EB 1997

Veterinary Isolates

Fig. 16. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. kentucky* from All Species



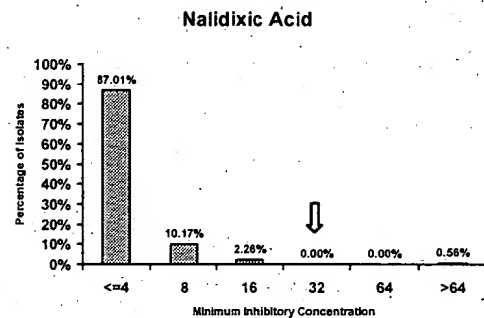
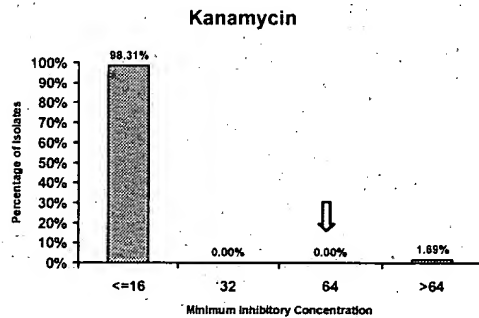
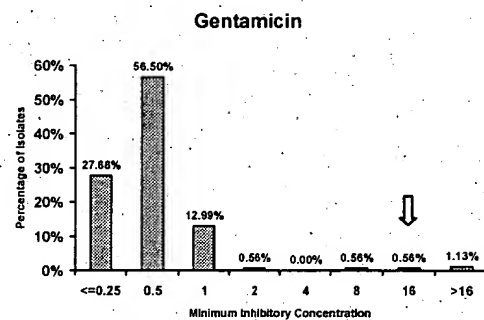
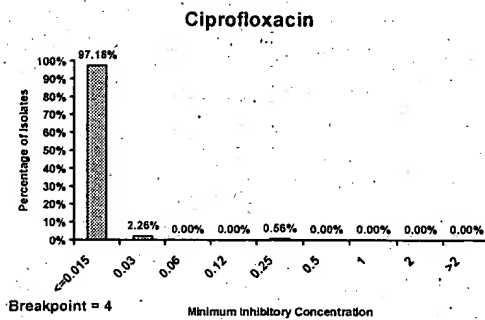
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n=177

NARMS - EB 1997

Veterinary Isolates

Fig. 16. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. kentucky* from All Species



↓ Breakpoint

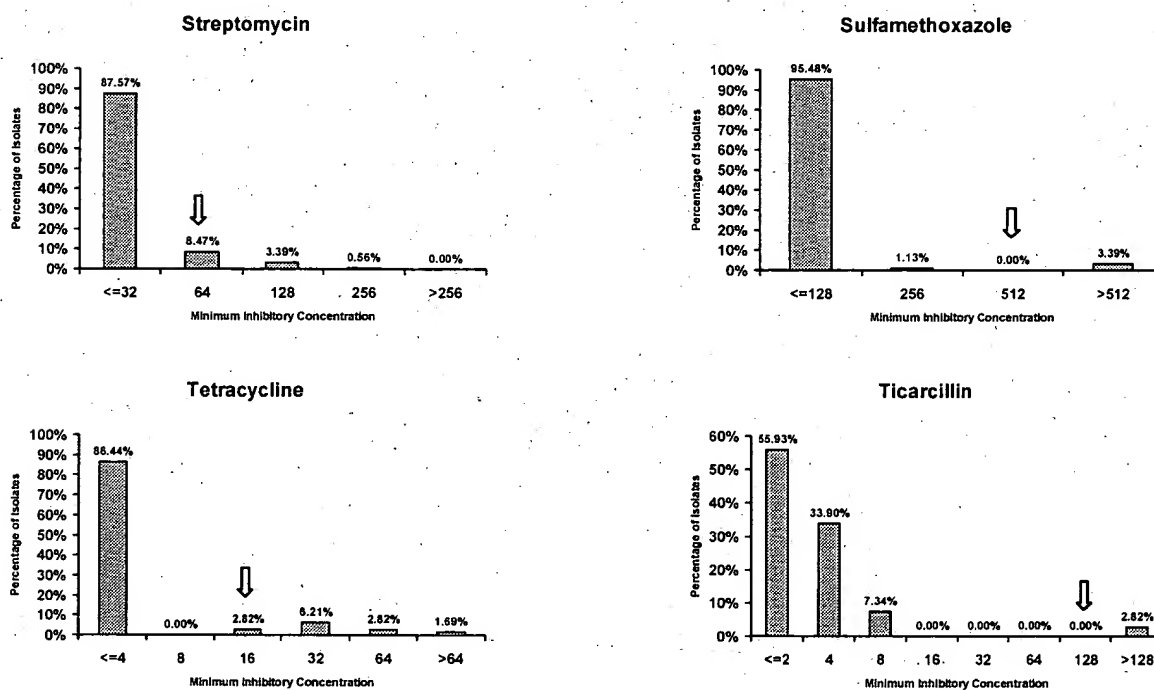
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116

NARMS - EB 1997

Veterinary Isolates

Fig. 16. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. kentucky* from All Species



↓ Breakpoint

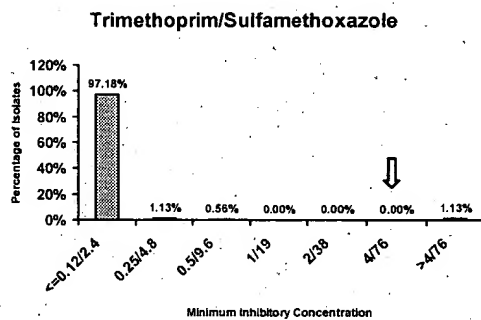
n=177

117

NARMS - EB 1997

Veterinary Isolates

Fig. 16. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. kentucky* from All Species



↓ Breakpoint

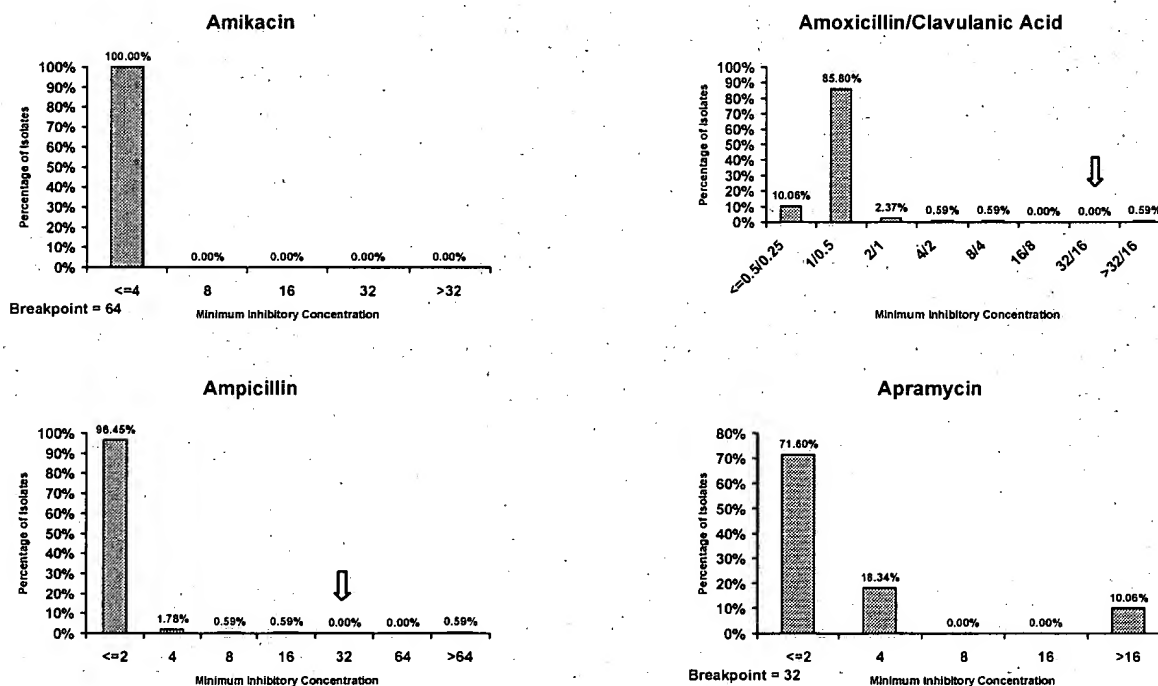
n=177

118

NARMS - EB 1997

Veterinary Isolates

Fig. 17. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. anatum* from All Species



↓ Breakpoint

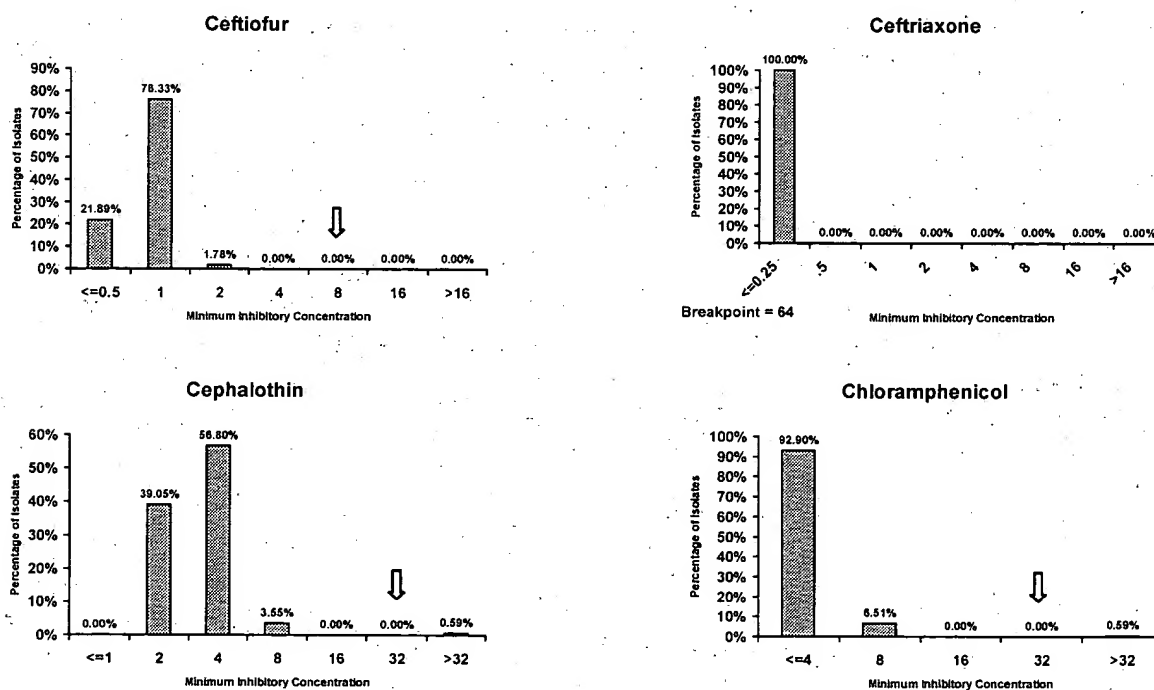
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119

NARMS - EB 1997

Veterinary Isolates

Fig. 17. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. anatum* from All Species



↓ Breakpoint

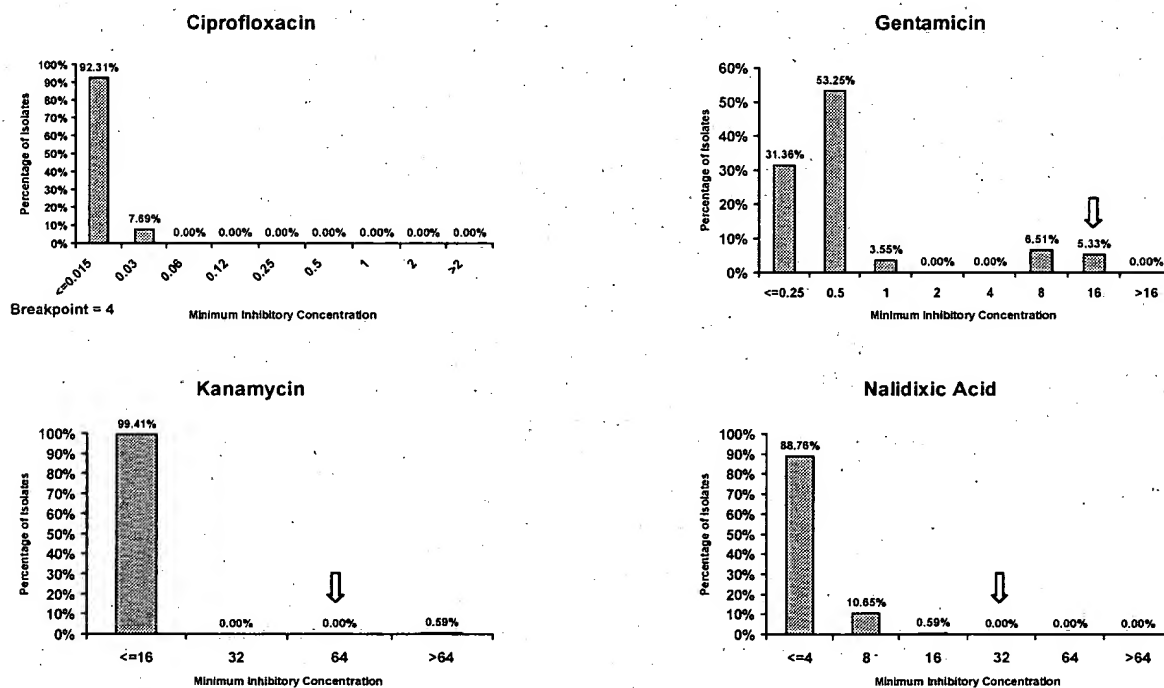
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120

NARMS - EB 1997

Veterinary Isolates

Fig. 17. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. anatum* from All Species



↓ Breakpoint

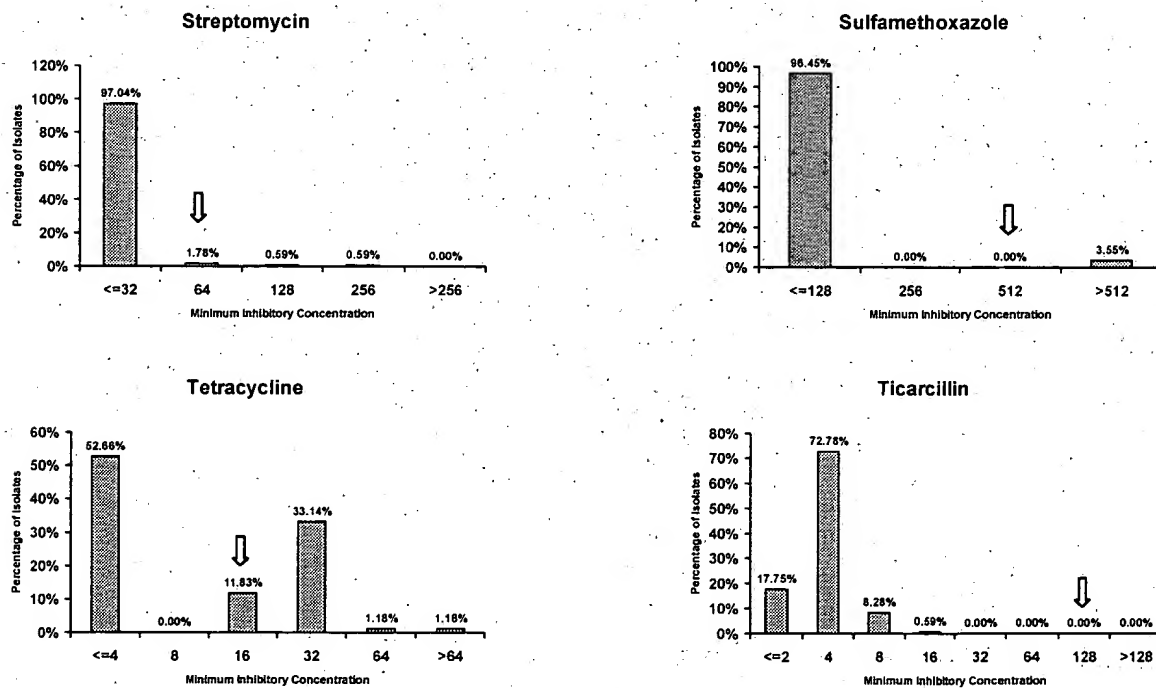
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121

NARMS - EB 1997

Veterinary Isolates

Fig. 17. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. anatum* from All Species



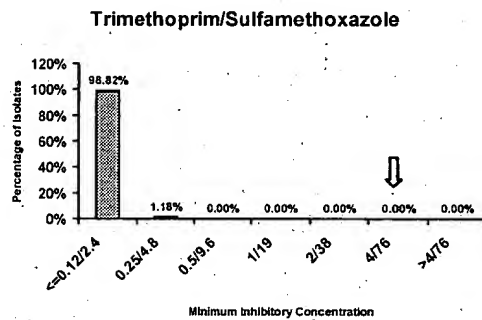
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NARMS - EB 1997

Veterinary Isolates

Fig. 17. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. anatum* from All Species



↓ Breakpoint

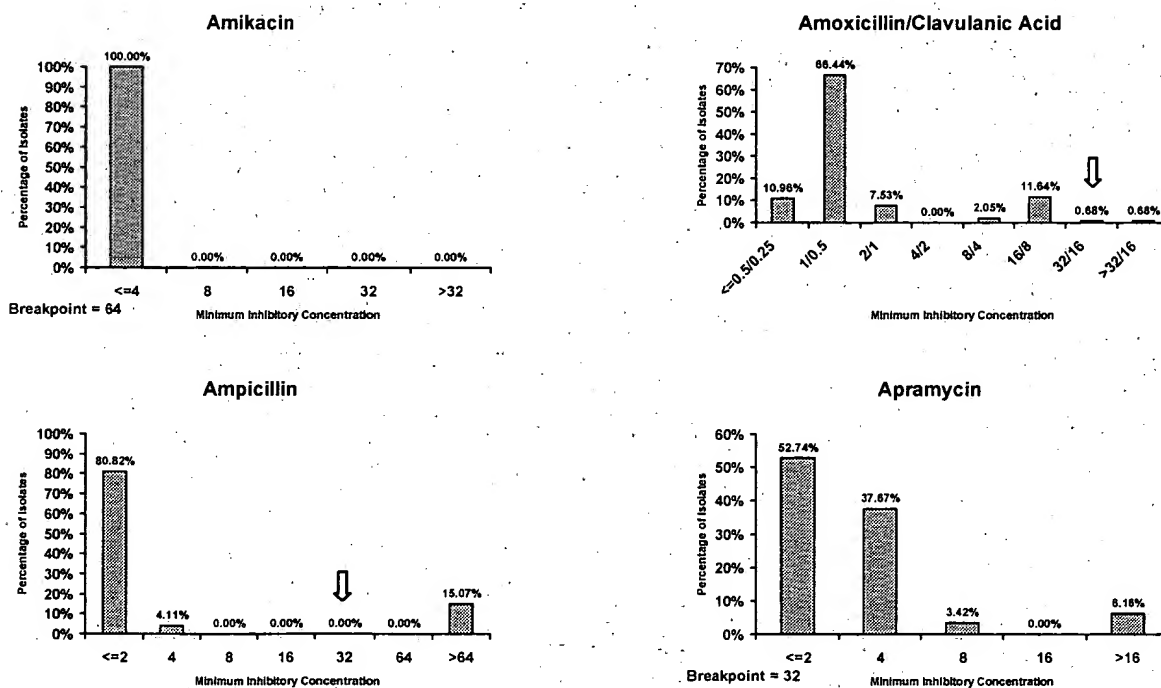
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123

NARMS - EB 1997

Veterinary Isolates

Fig. 18. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. heidelberg* from All Species



↓ Breakpoint

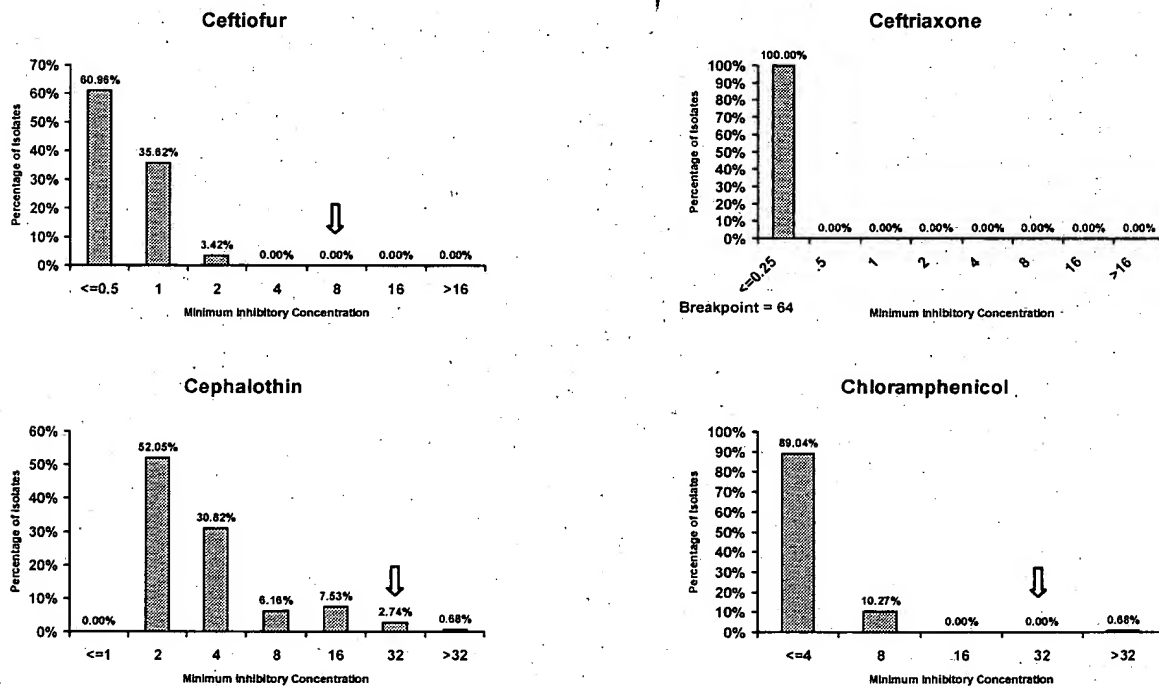
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124

NARMS - EB 1997

Veterinary Isolates

Fig. 18. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. heidelberg* from All Species



↓ Breakpoint

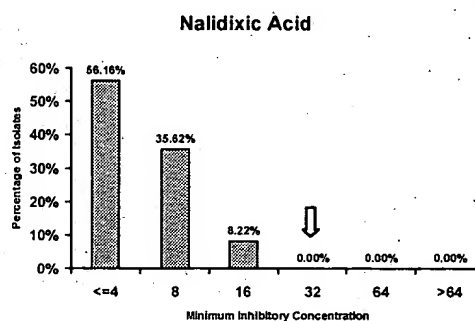
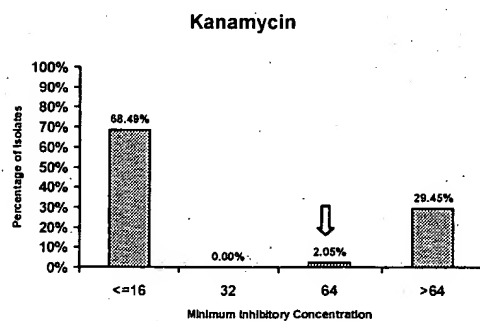
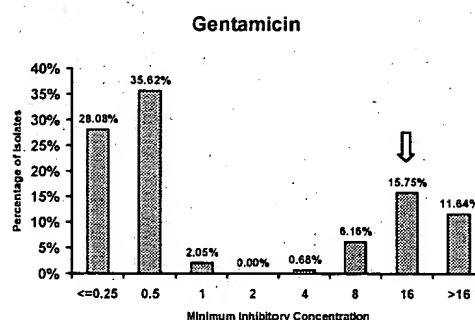
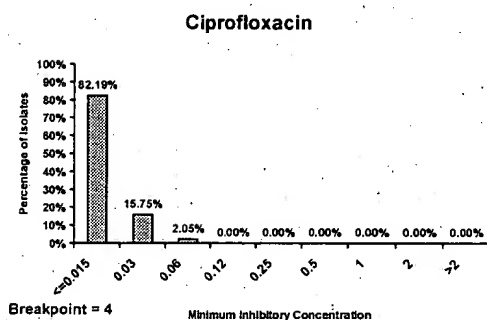
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125

NARMS - EB 1997

Veterinary Isolates

Fig. 18. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. heidelberg* from All Species



↓ Breakpoint

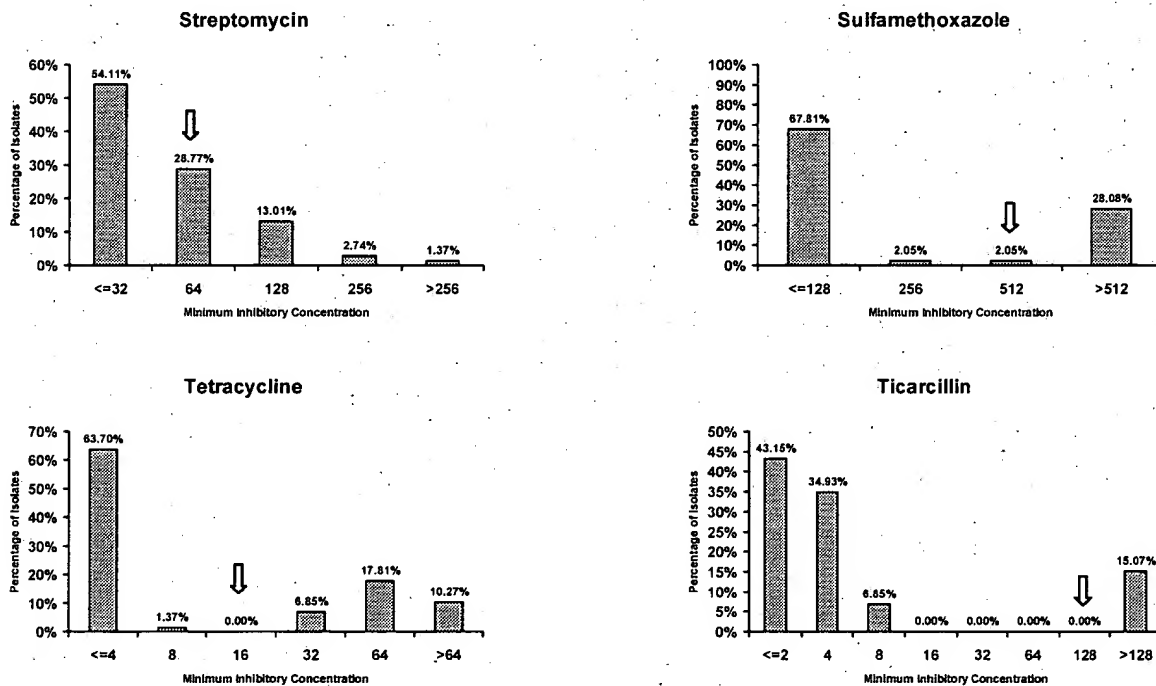
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126

NARMS - EB 1997

Veterinary Isolates

Fig. 18. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. heidelberg* from All Species



↓ Breakpoint

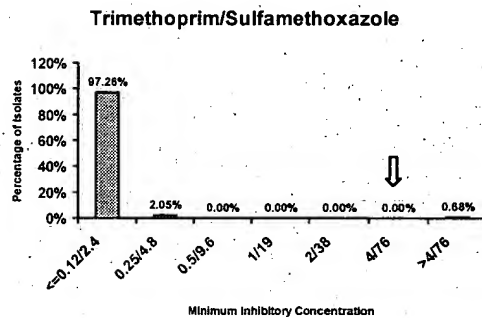
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127

NARMS - EB 1997

Veterinary Isolates

Fig. 18. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. heidelberg* from All Species



⇓ Breakpoint

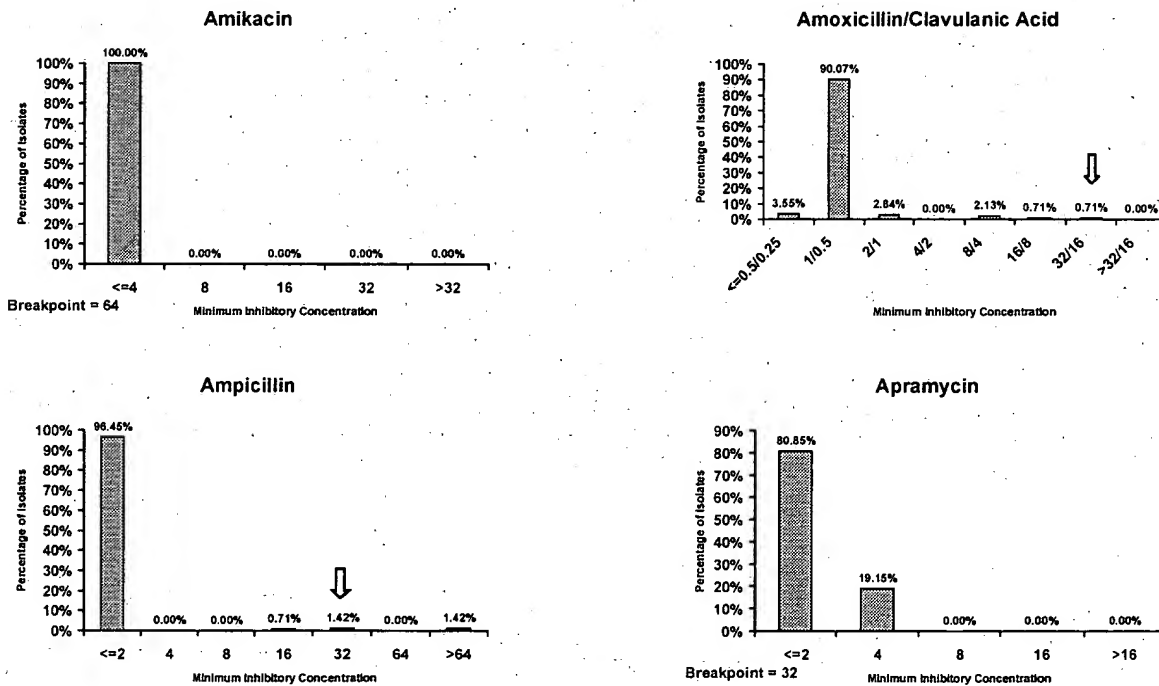
n=146

128

NARMS - EB 1997

Veterinary Isolates

Fig. 19. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. agona* from All Species



↓ Breakpoint

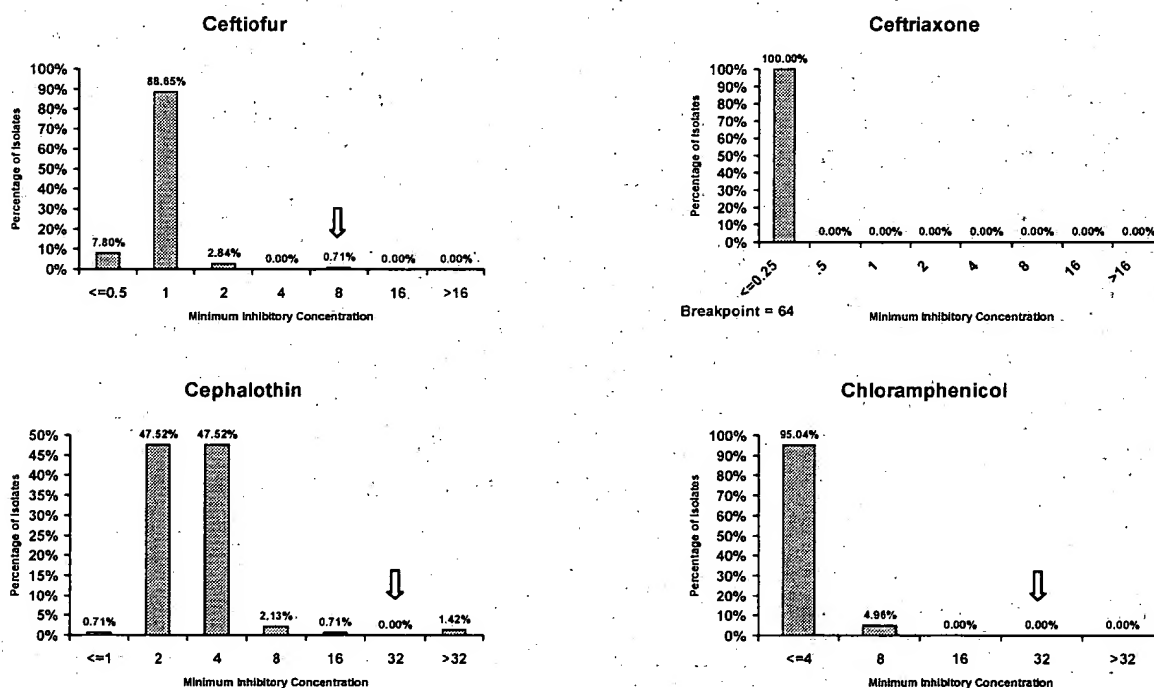
n=141

129

NARMS - EB 1997

Veterinary Isolates

Fig. 19. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. agona* from All Species



↓ Breakpoint

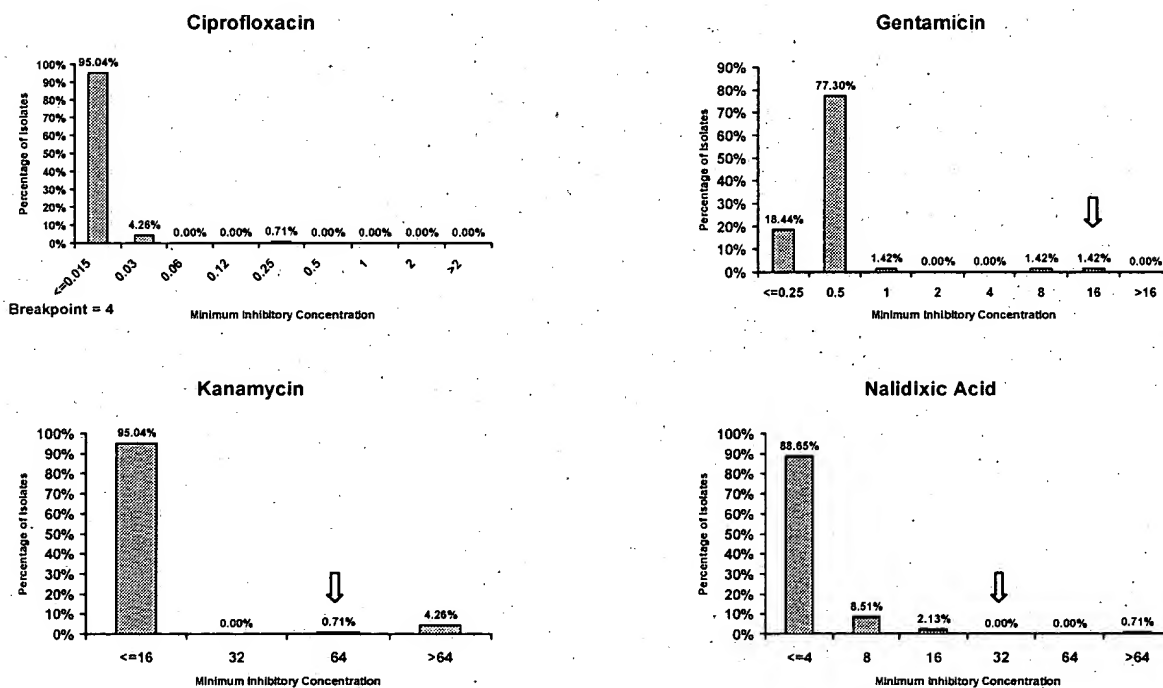
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130

NARMS - EB 1997

Veterinary Isolates

Fig. 19. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. agona* from All Species



↓ Breakpoint

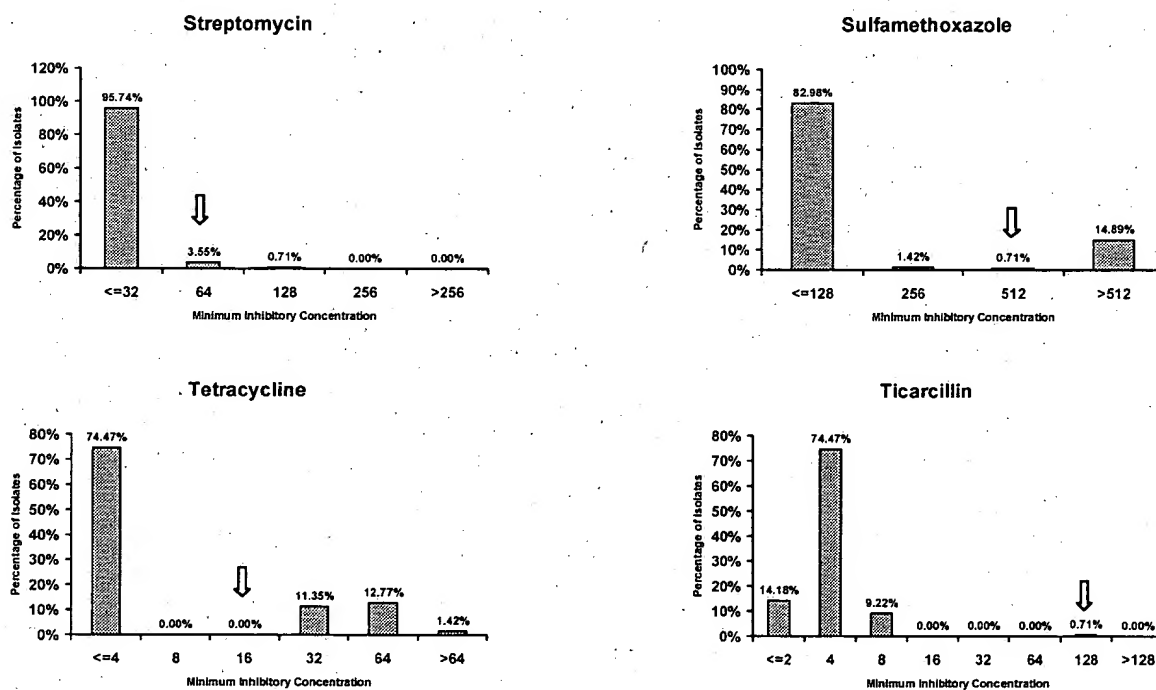
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131

NARMS - EB 1997

Veterinary Isolates

Fig. 19. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. agona* from All Species



↓ Breakpoint

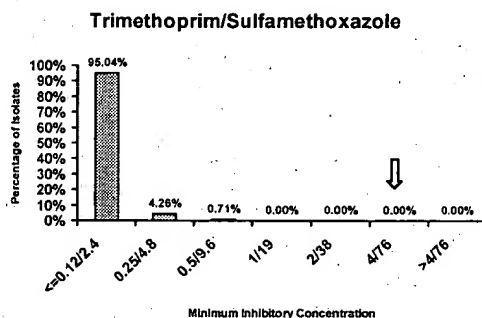
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132

NARMS - EB 1997

Veterinary Isolates

Fig. 19. Minimum Inhibitory Concentrations by Antimicrobial Agent for *S. agona* from All Species



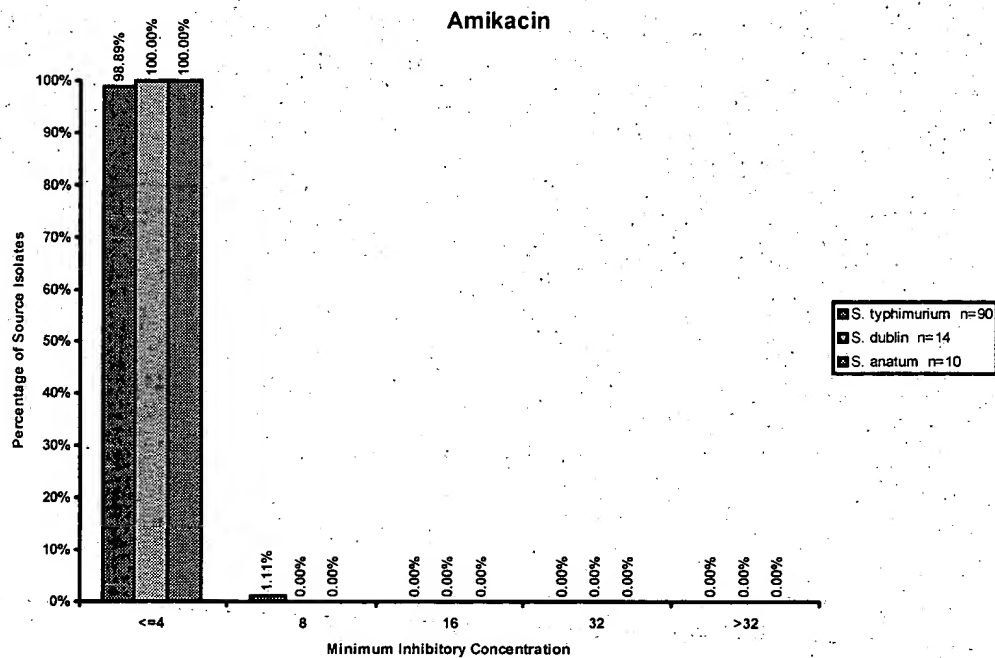
↓ Breakpoint

n=141

133

NARMS - EB 1997 **Veterinary Isolates**

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

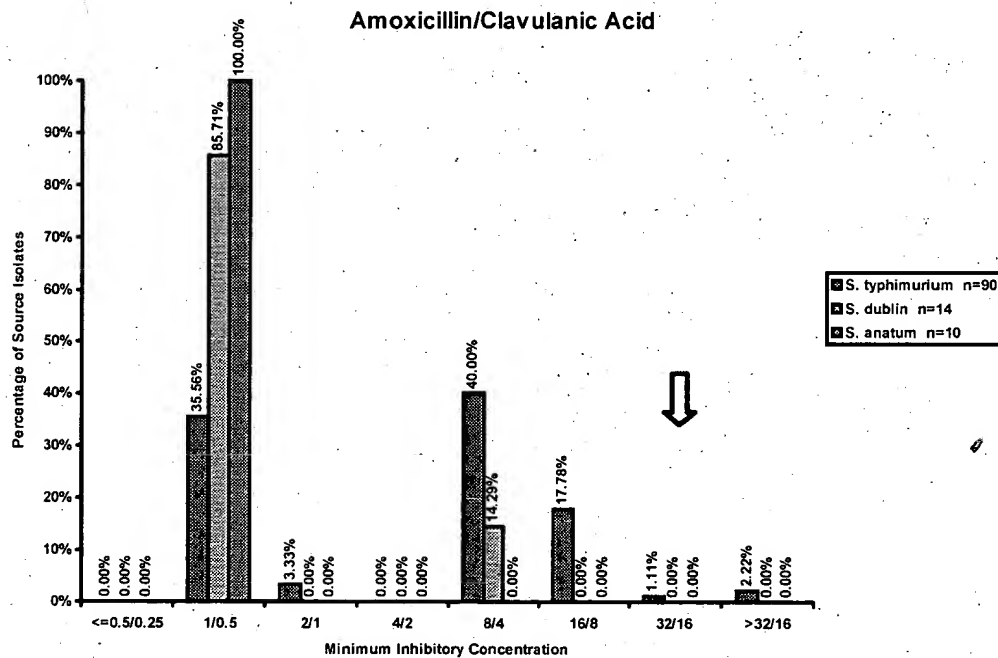


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

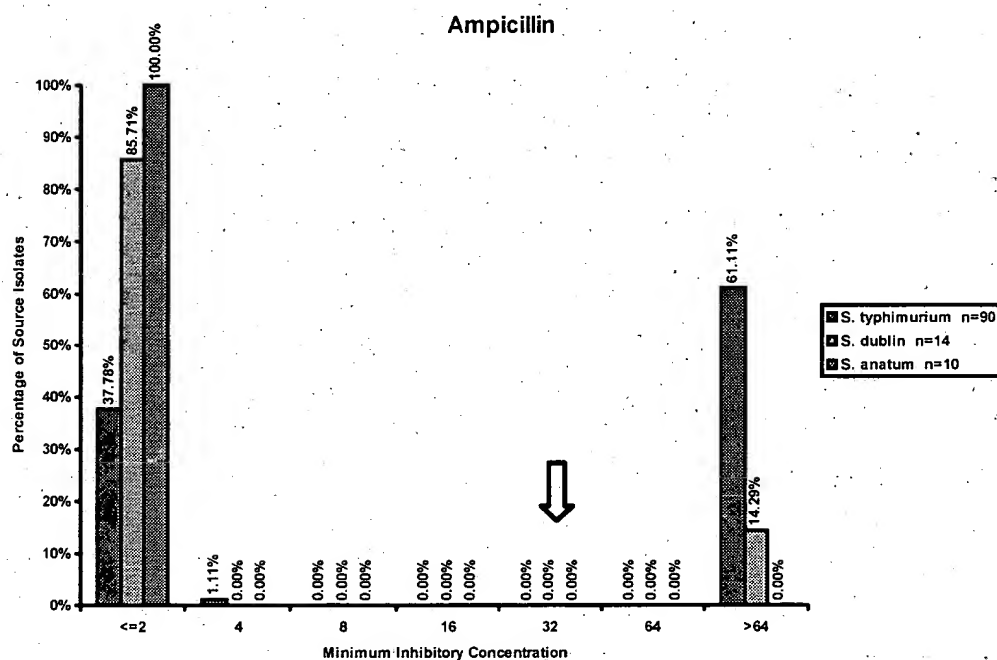


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

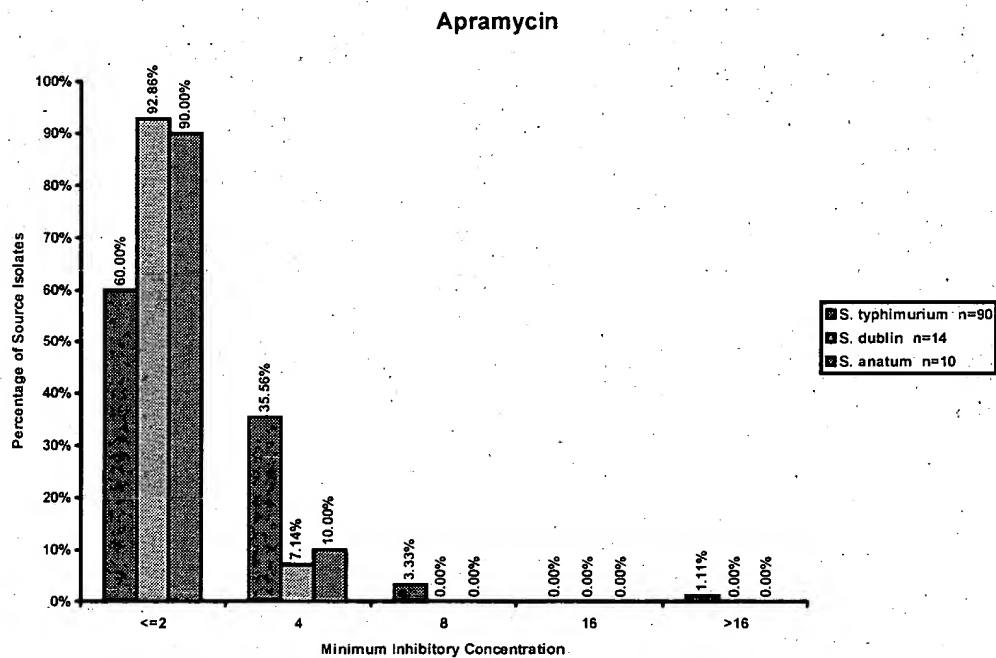


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

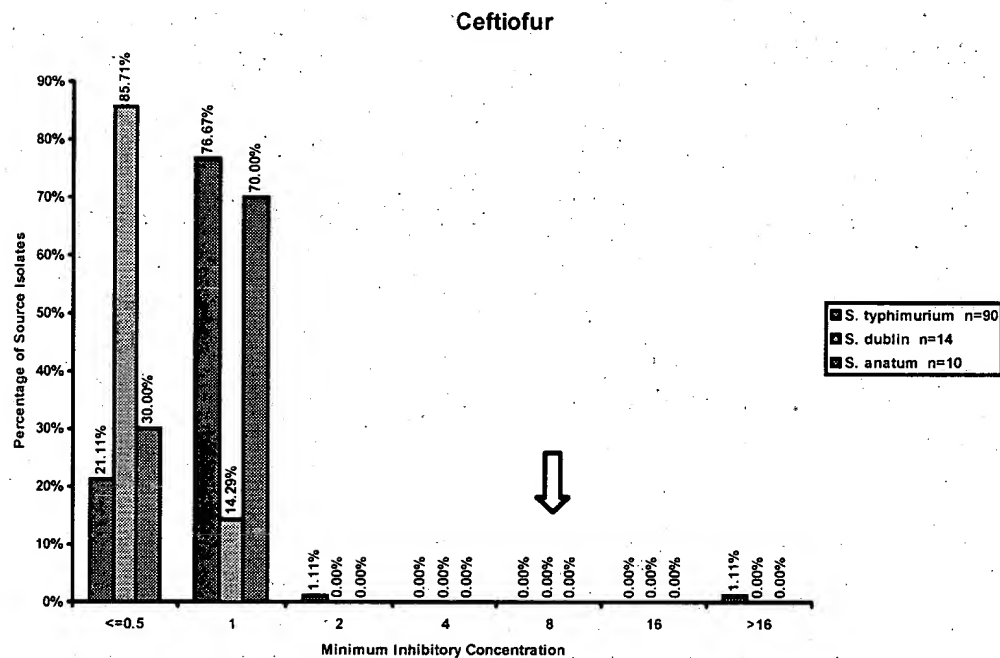


Breakpoint = 32

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

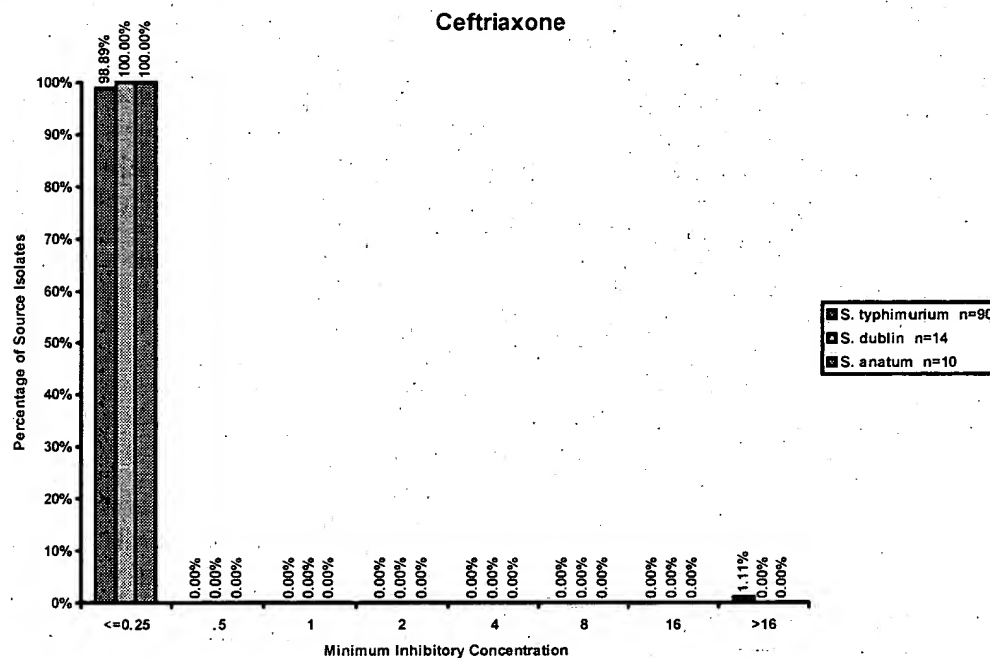


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

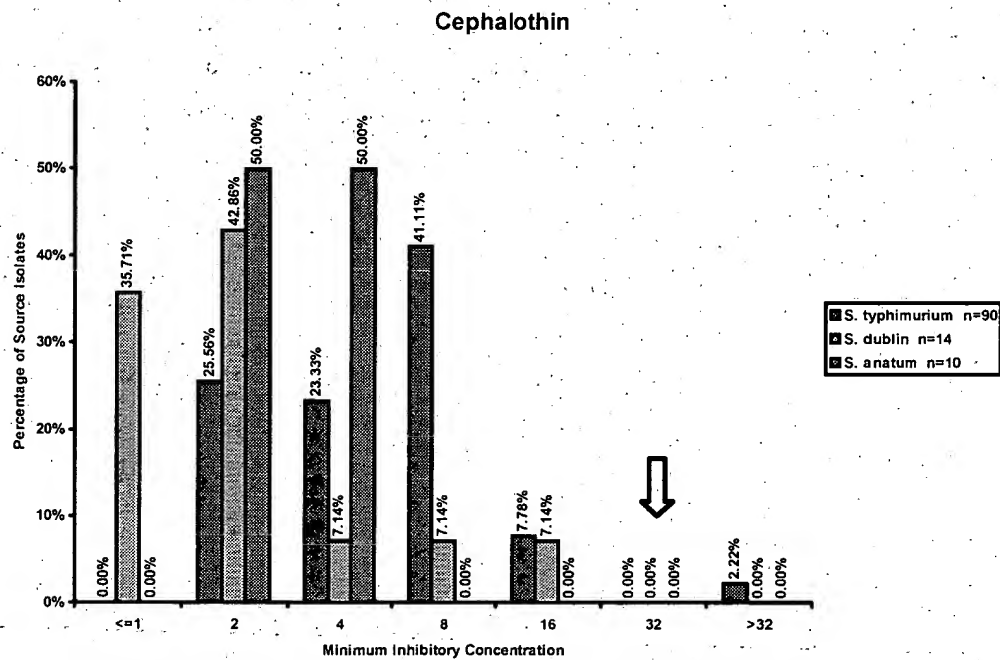


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

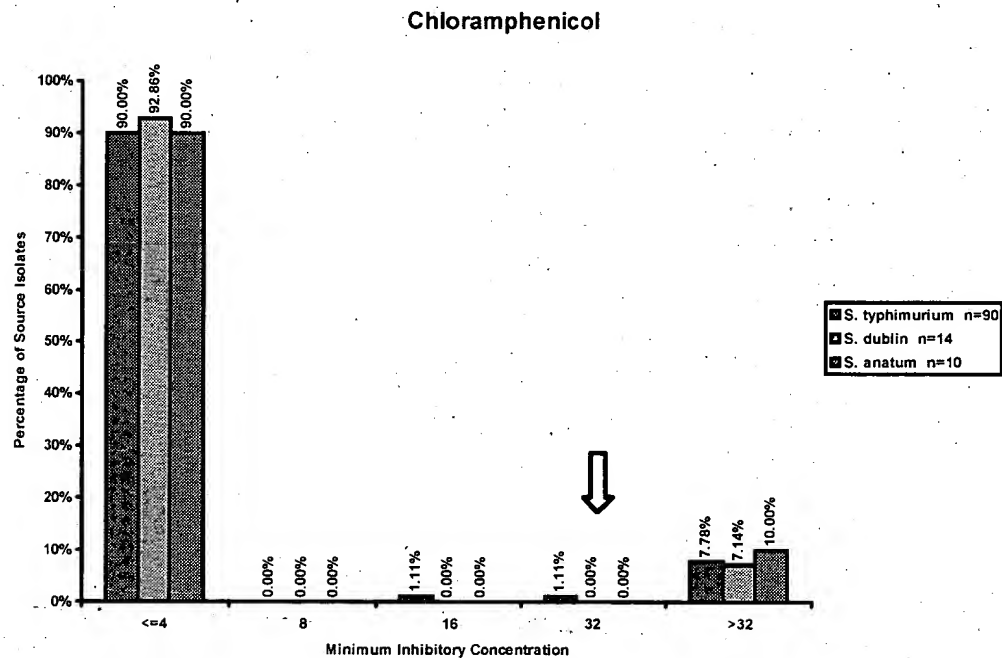


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

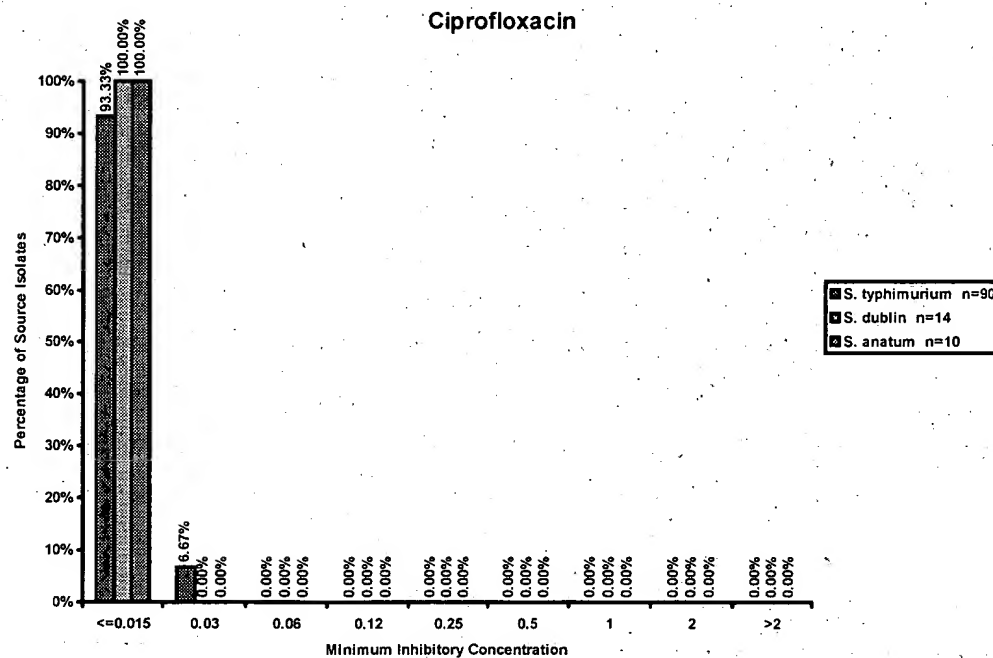


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

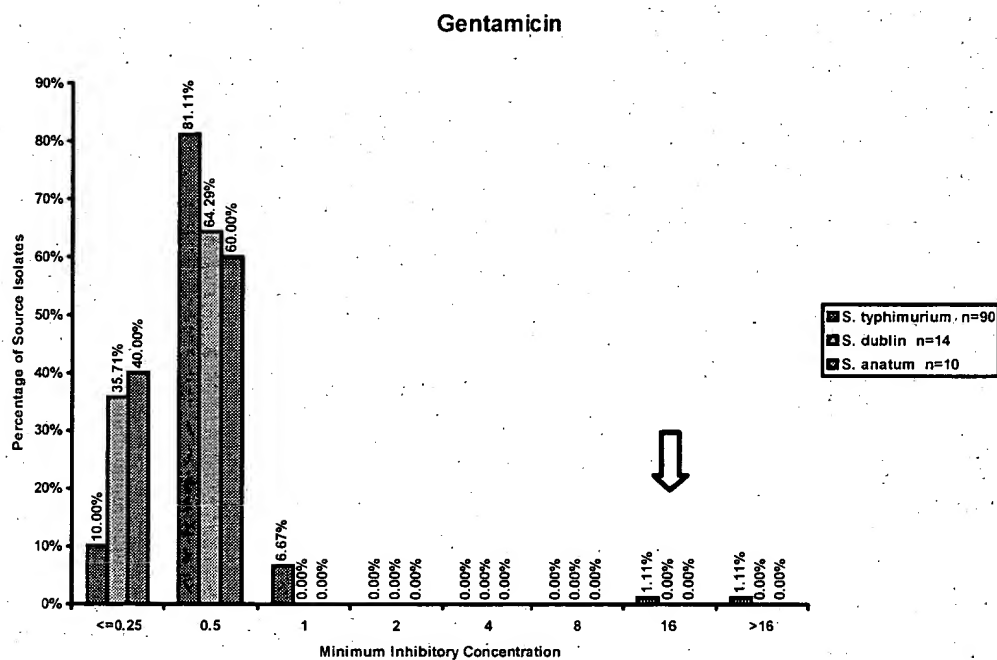


Breakpoint = 4

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

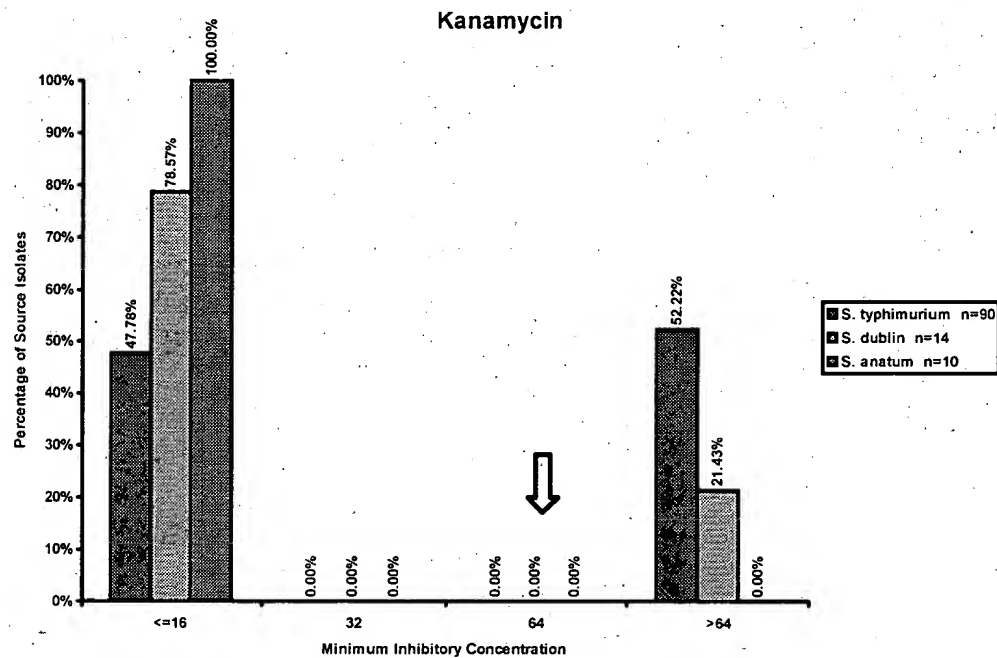


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

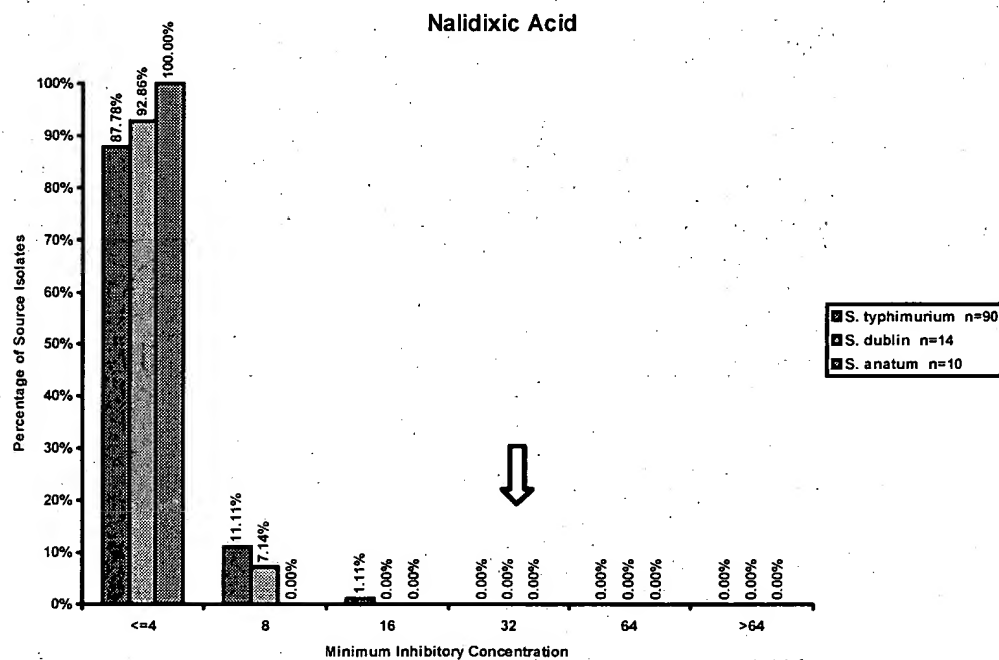


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

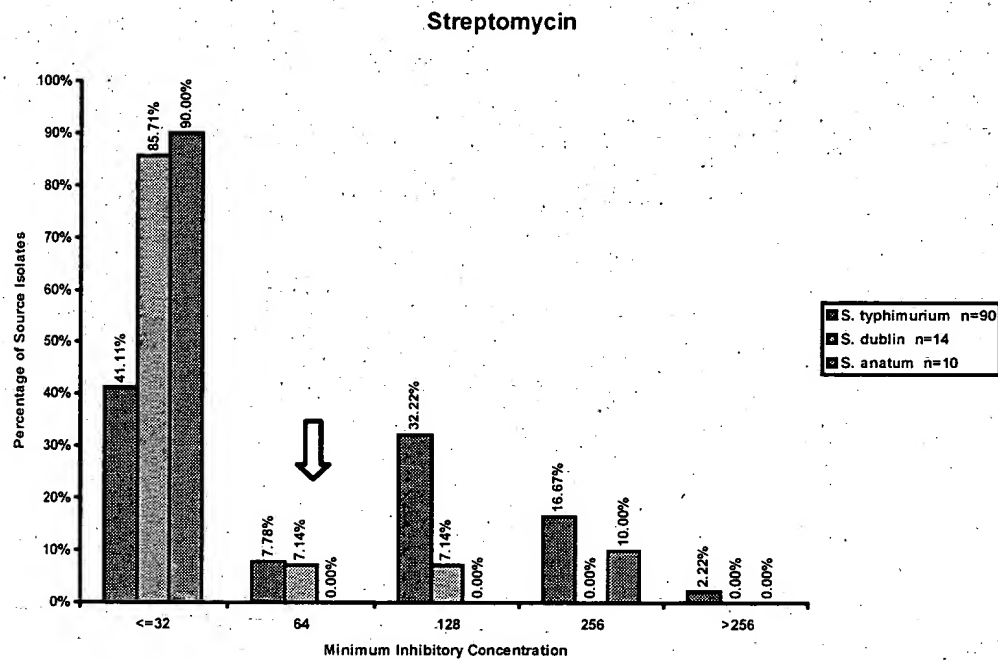


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

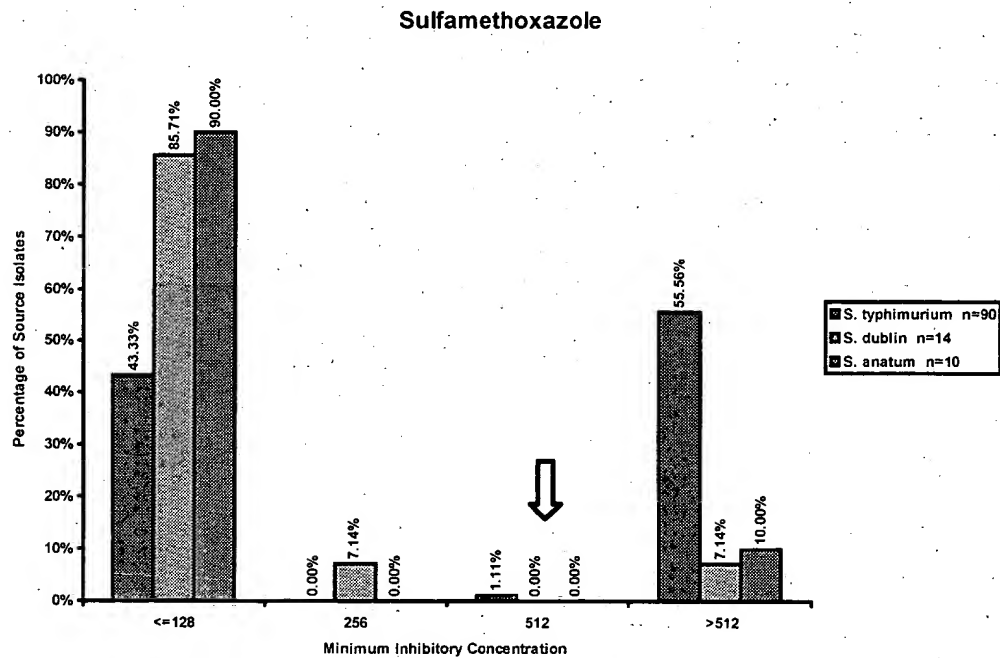


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

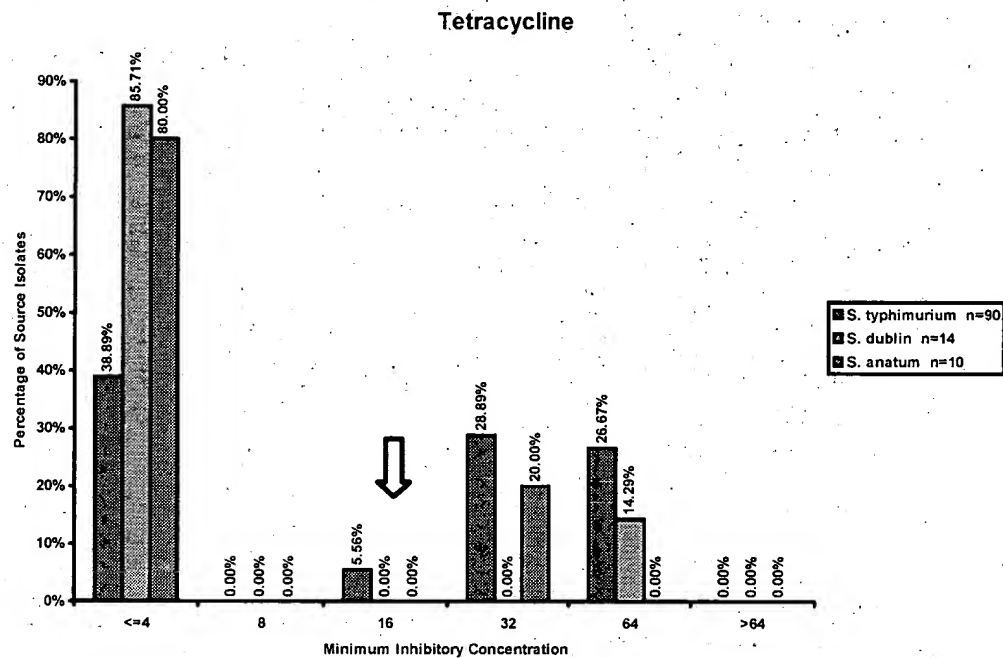


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

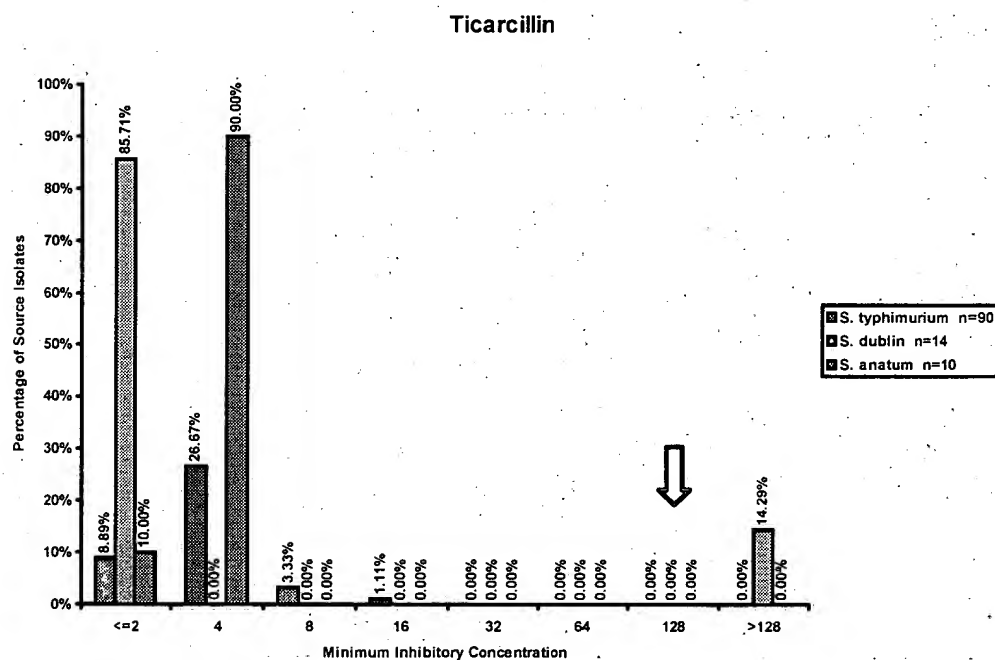


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NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

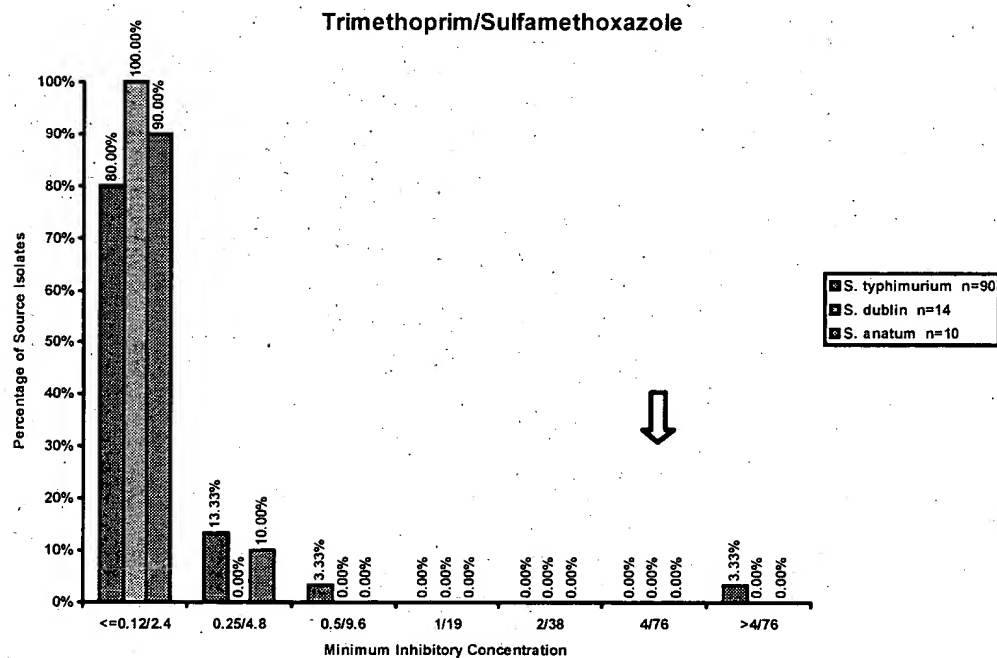


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 20. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Diagnostic)**

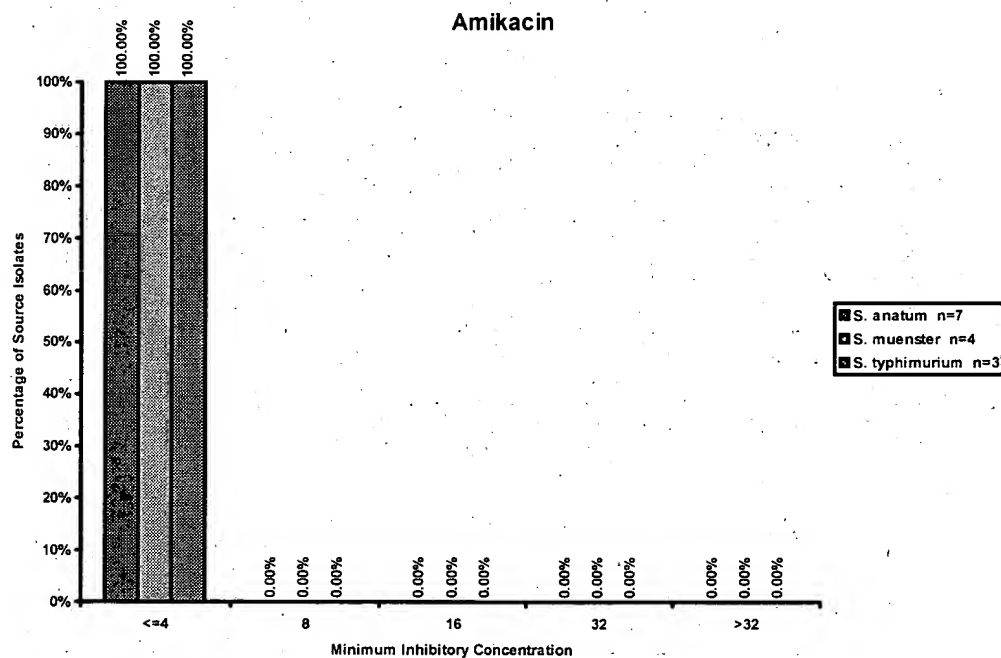


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**

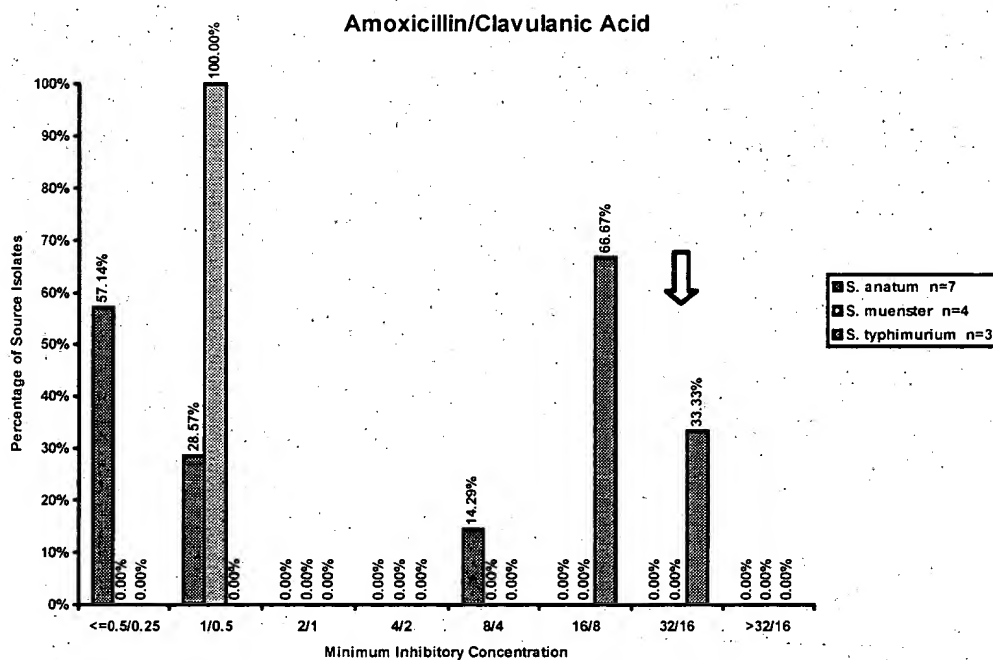


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**

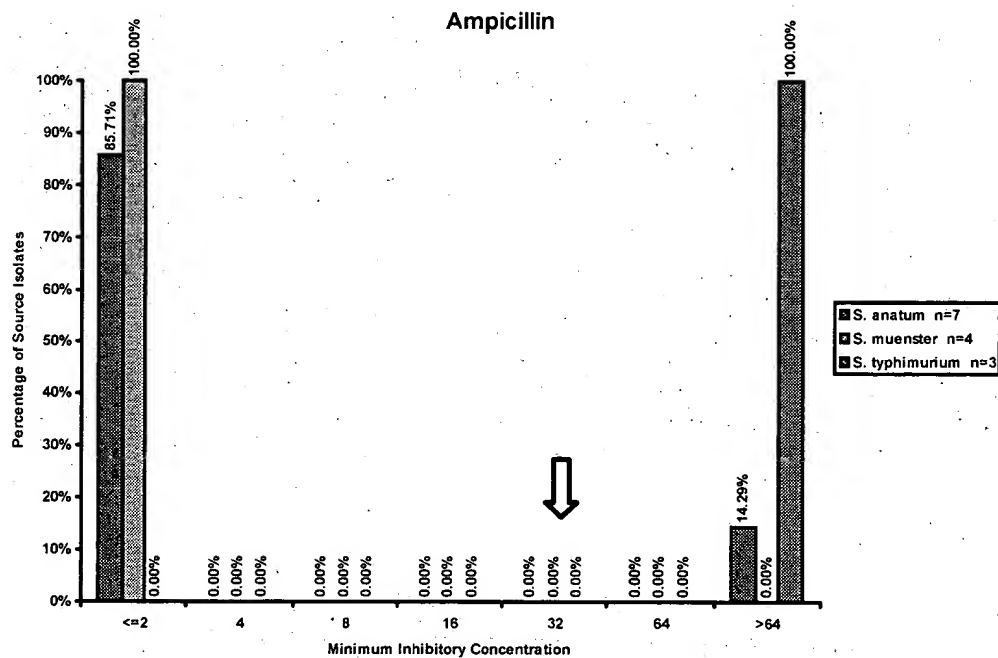


⇓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)

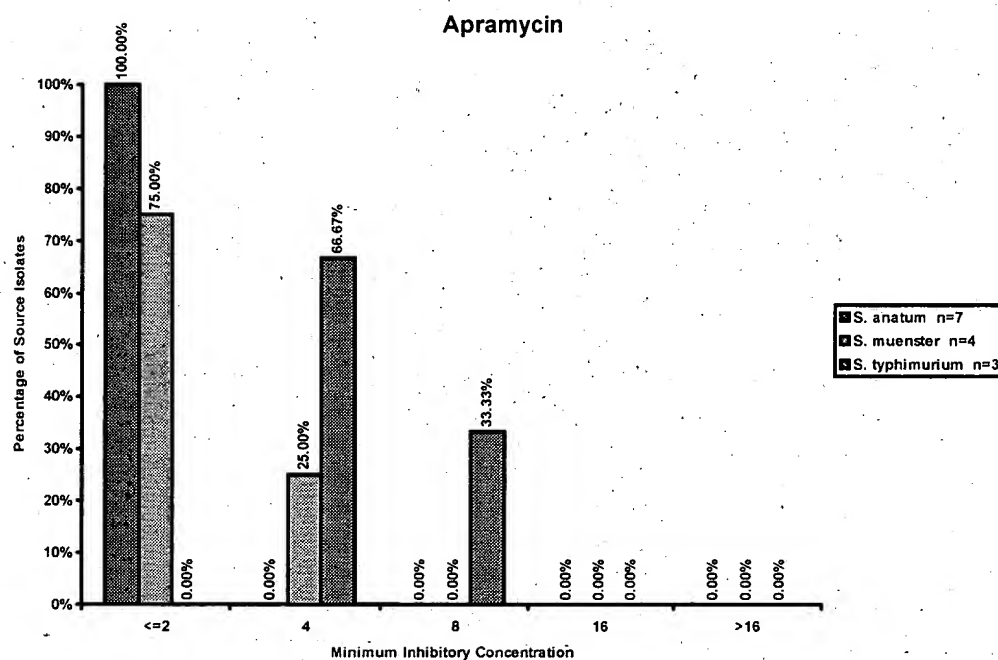


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**

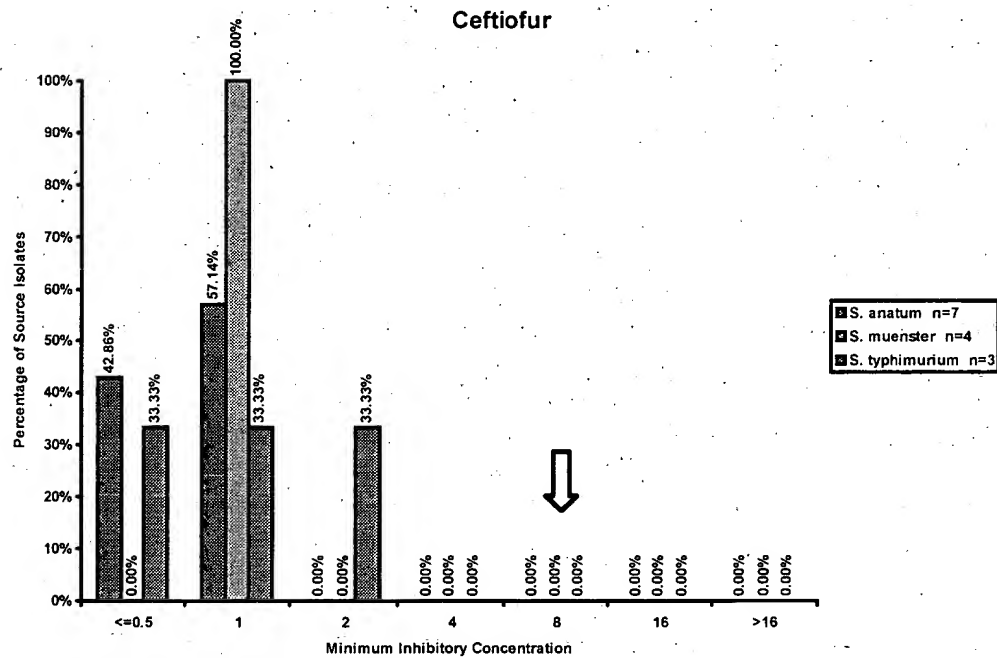


Breakpoint = 32

NARMS - EB 1997

Veterinary Isolates

**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**

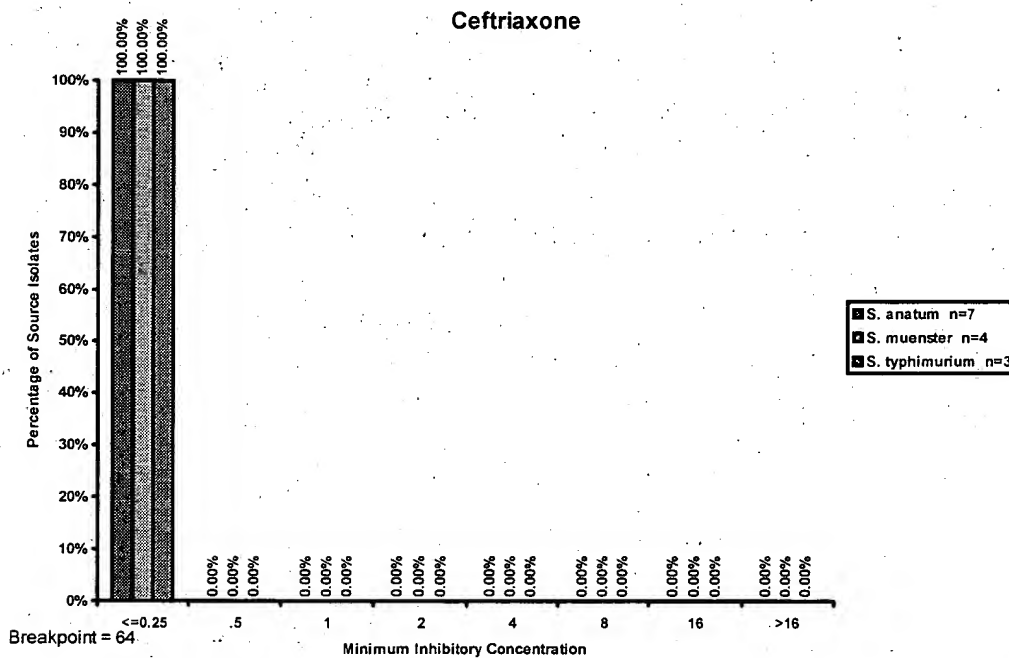


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**

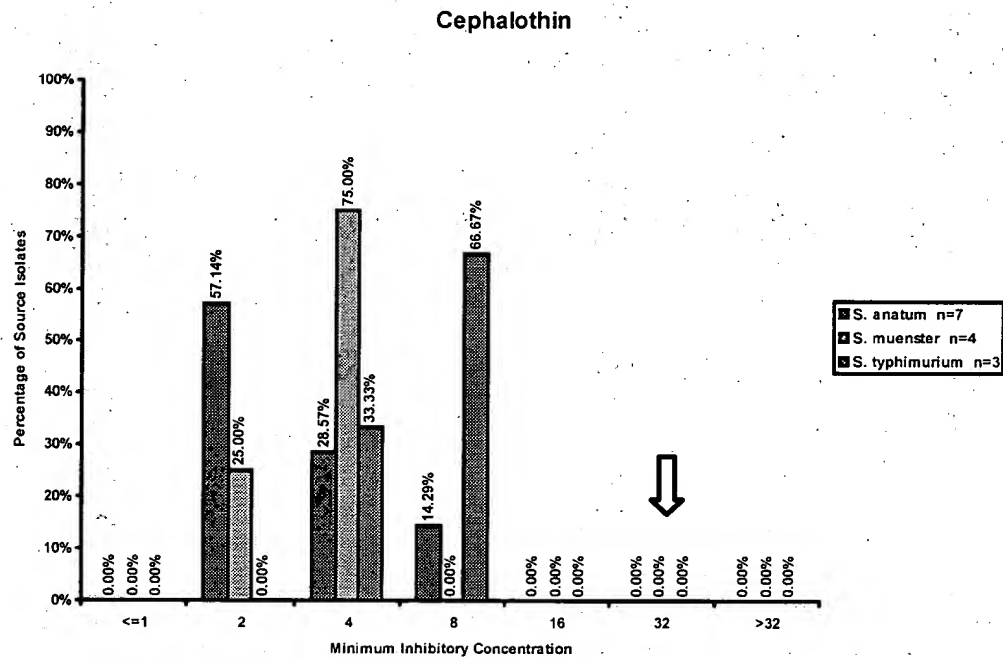


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**

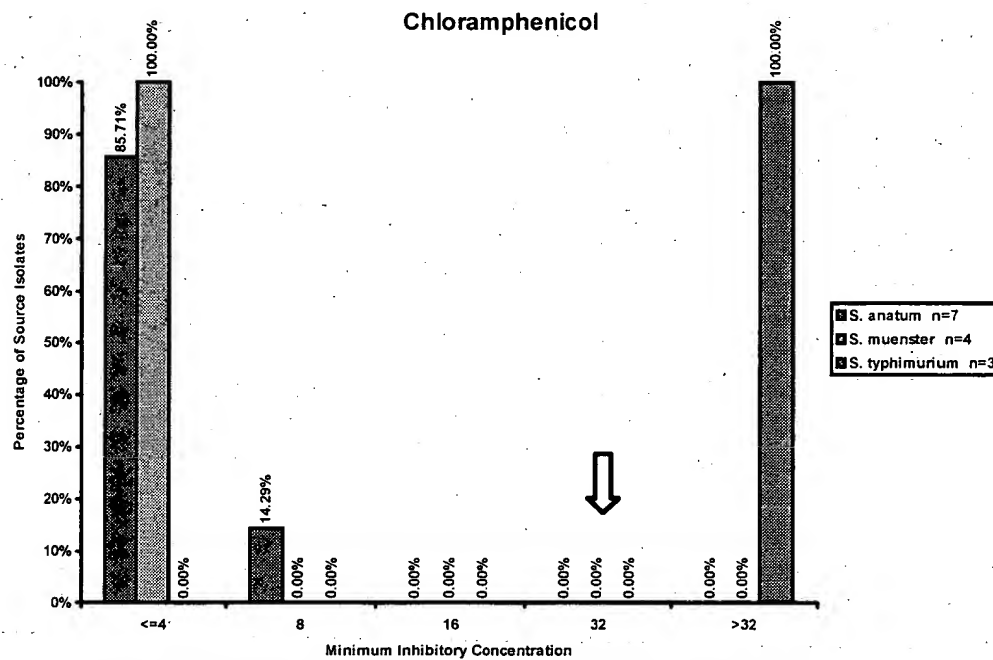


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

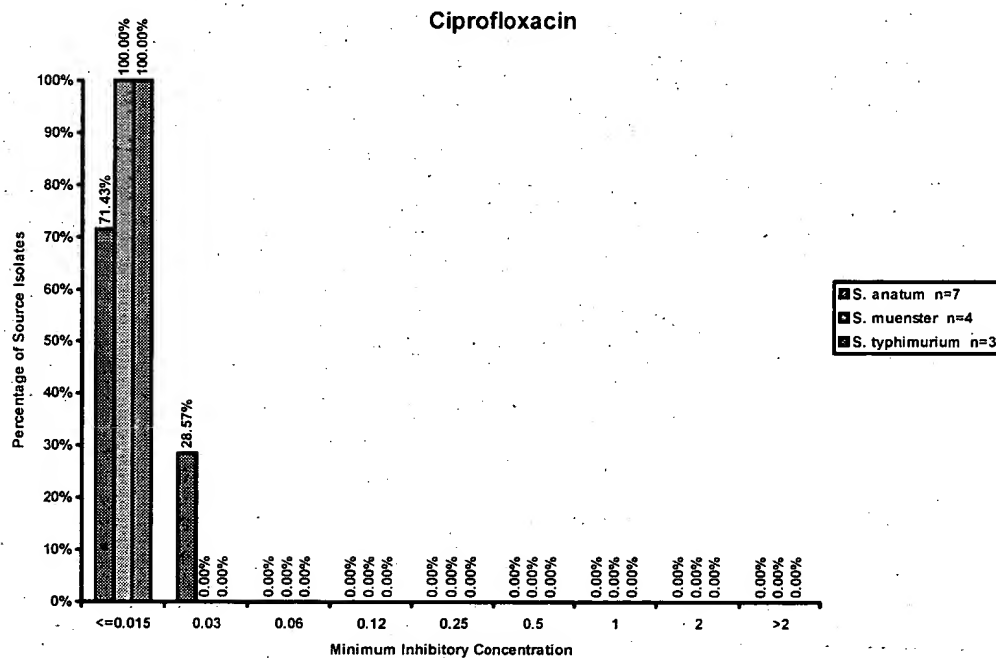
**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**



NARMS - EB 1997

Veterinary Isolates

**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**

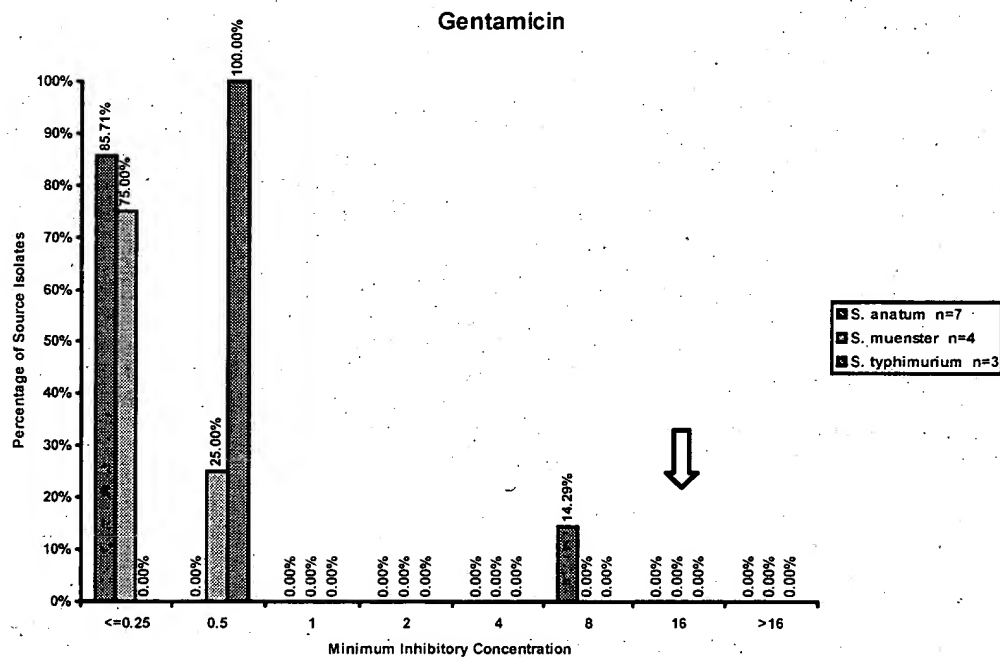


Breakpoint = 4

NARMS - EB 1997

Veterinary Isolates

**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**

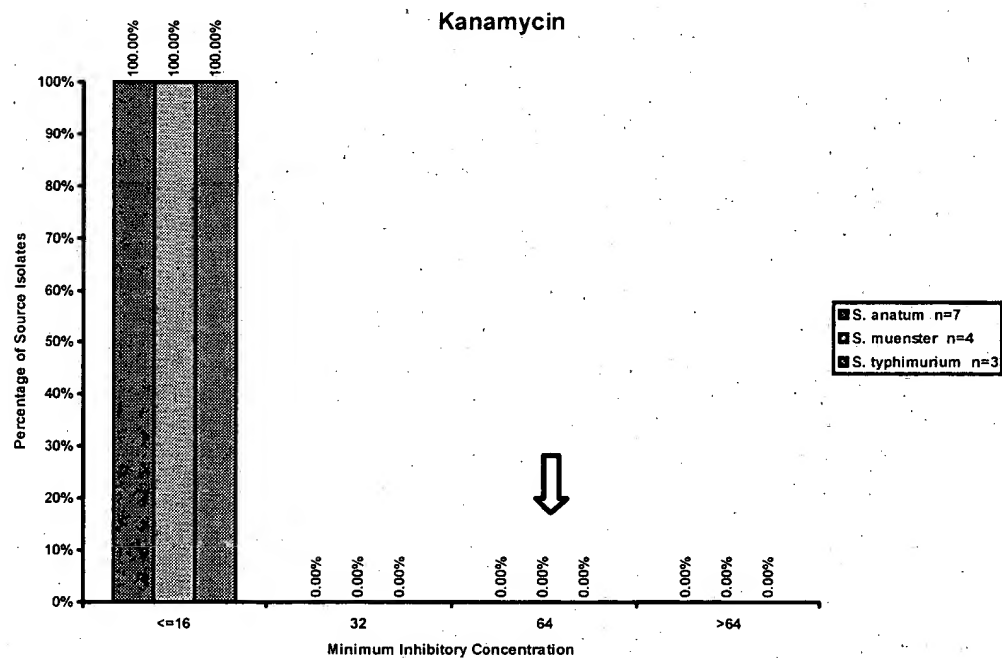


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

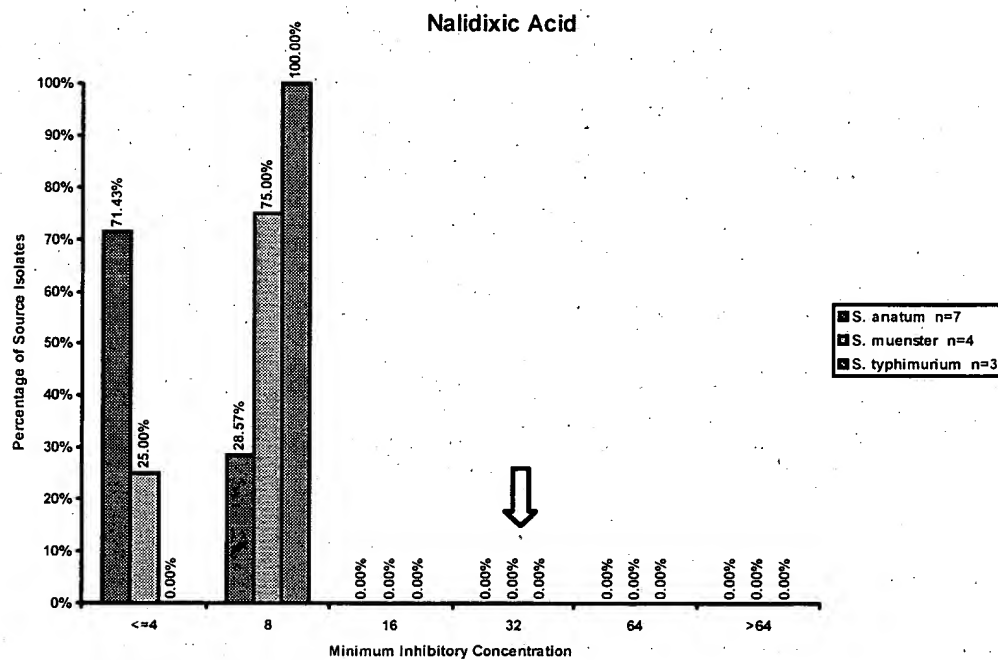
**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**



NARMS - EB 1997

Veterinary Isolates

**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**

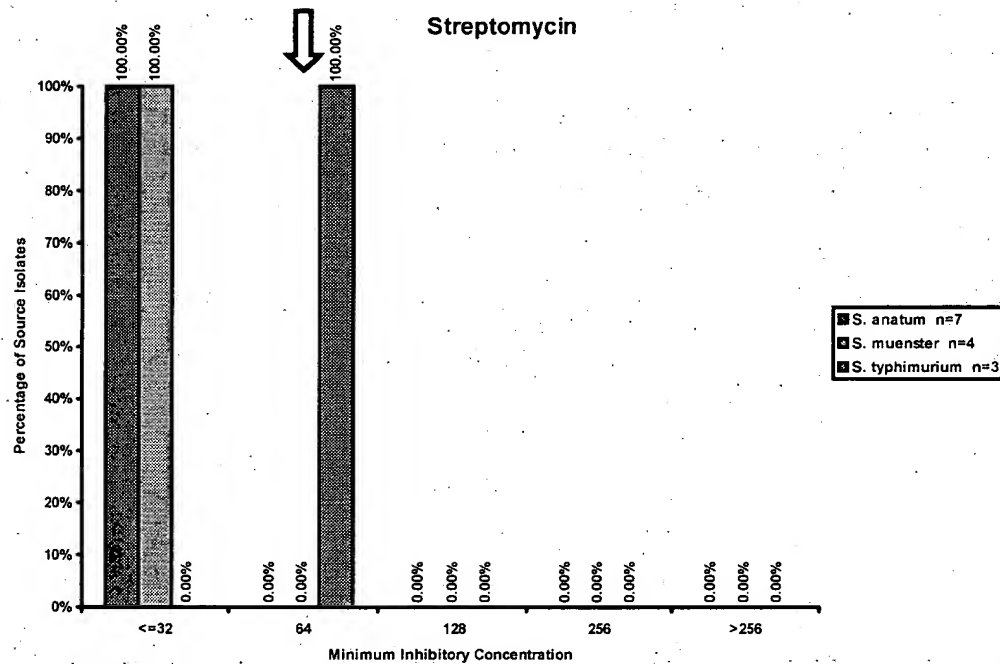


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**

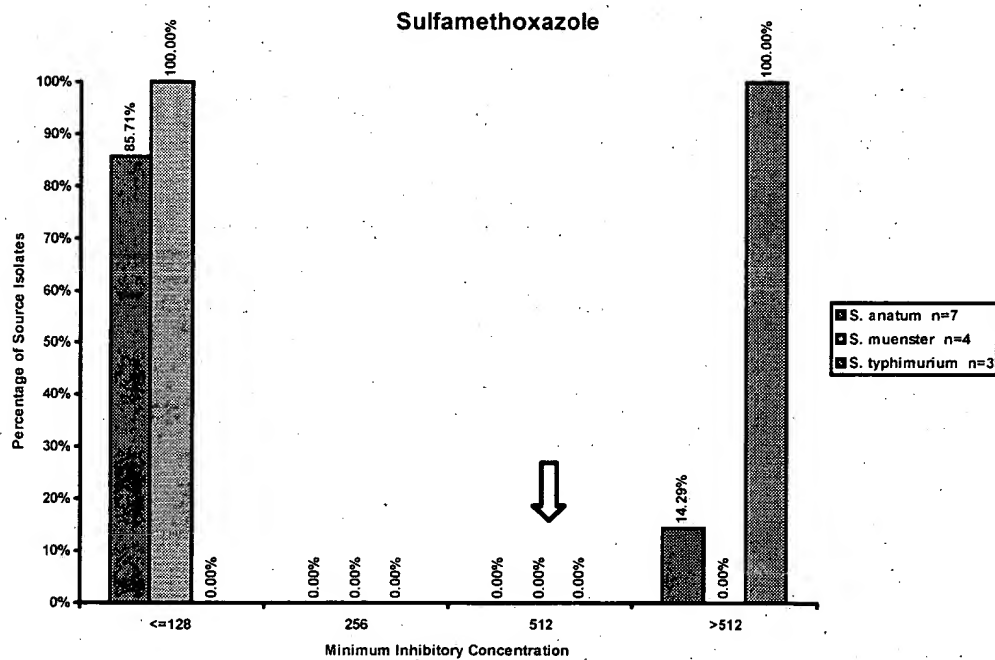


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**

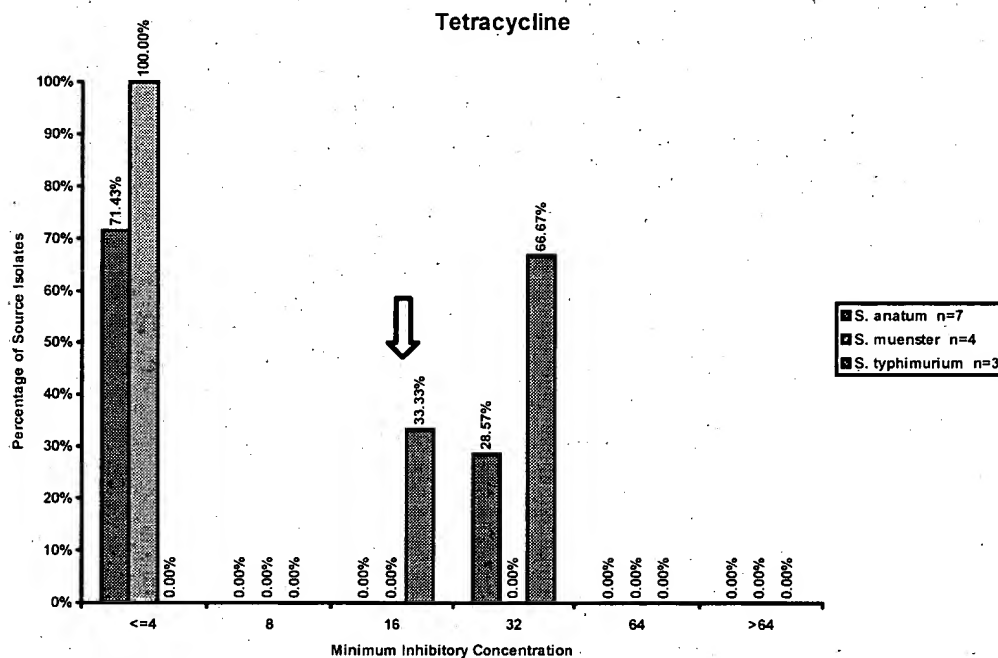


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NARMS - EB 1997

Veterinary Isolates

**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**

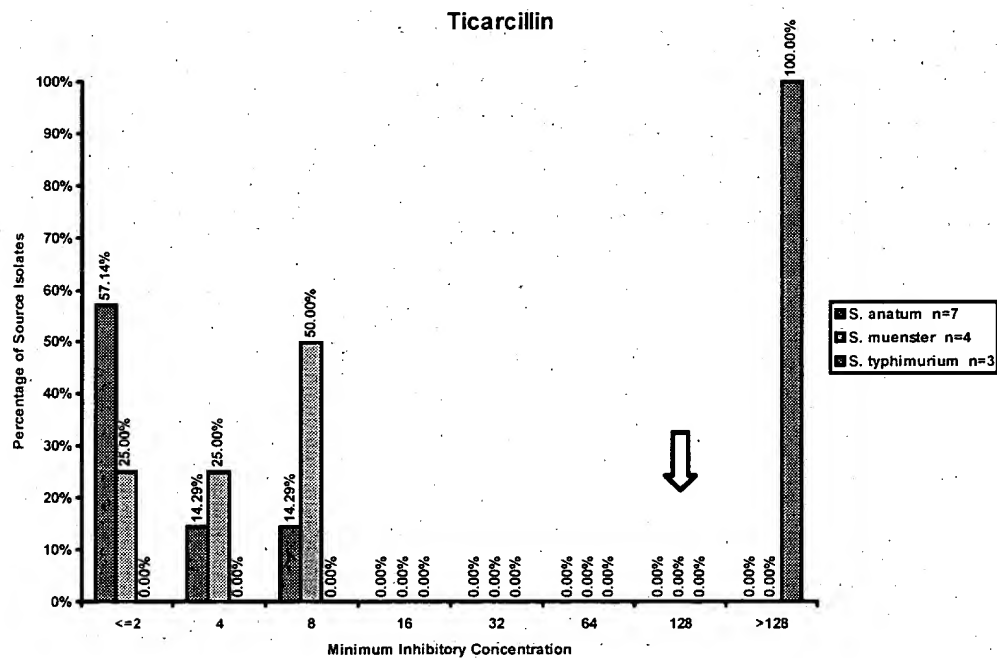


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**

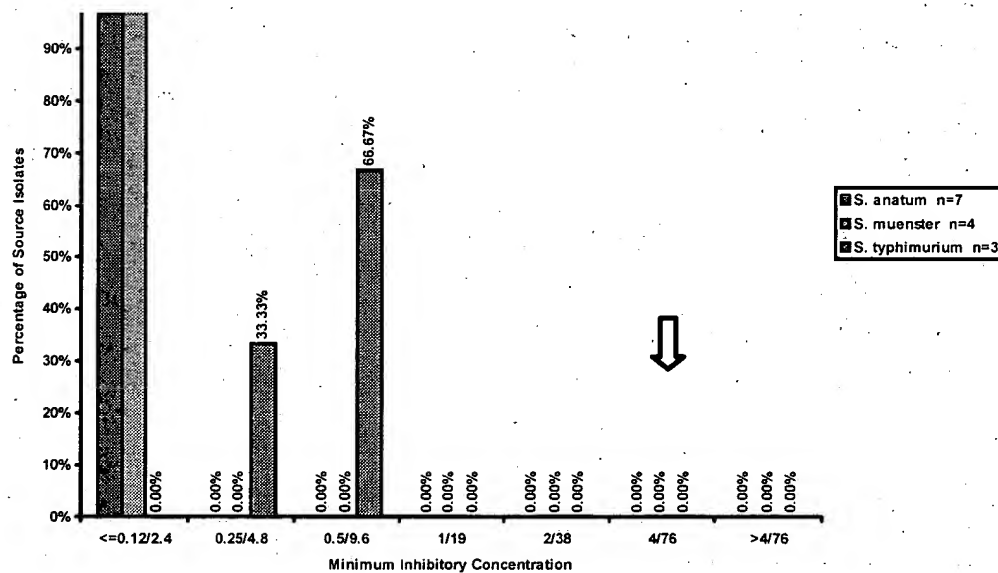


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 21. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Cattle (Slaughter)**

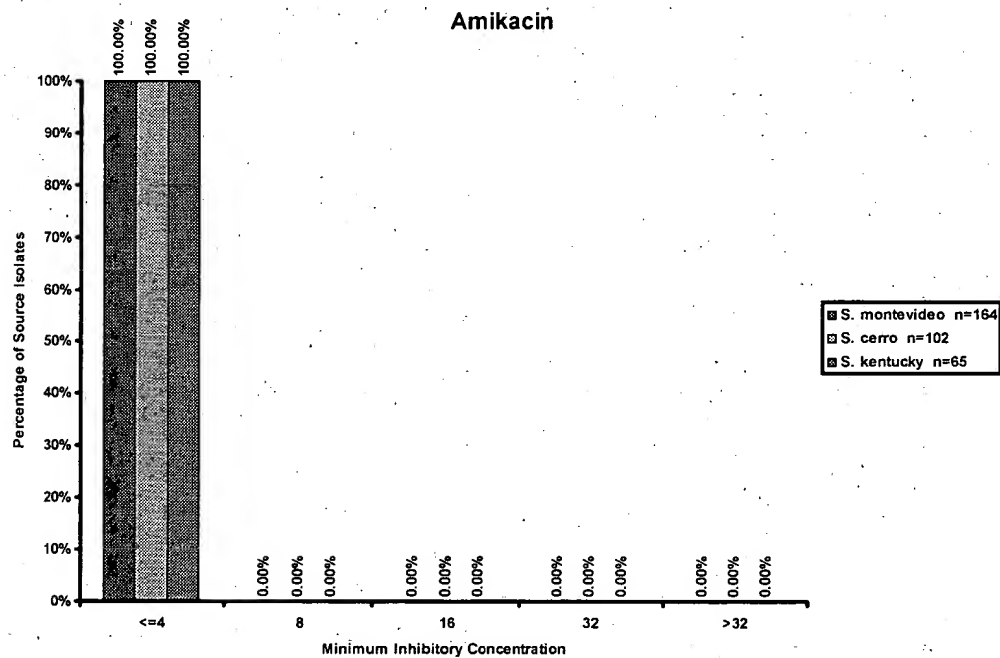


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

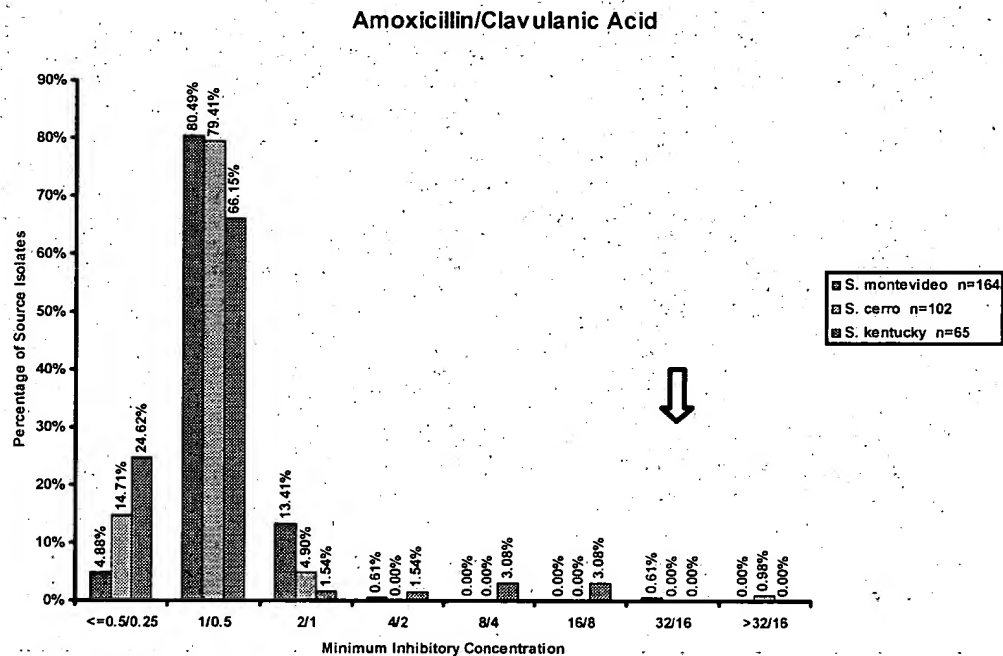


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

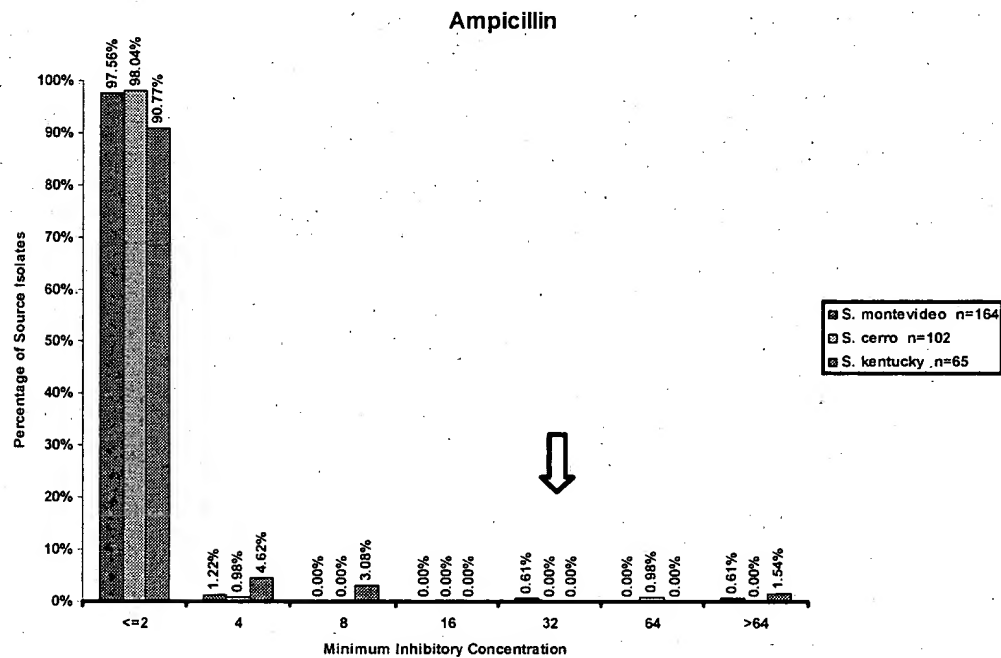


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

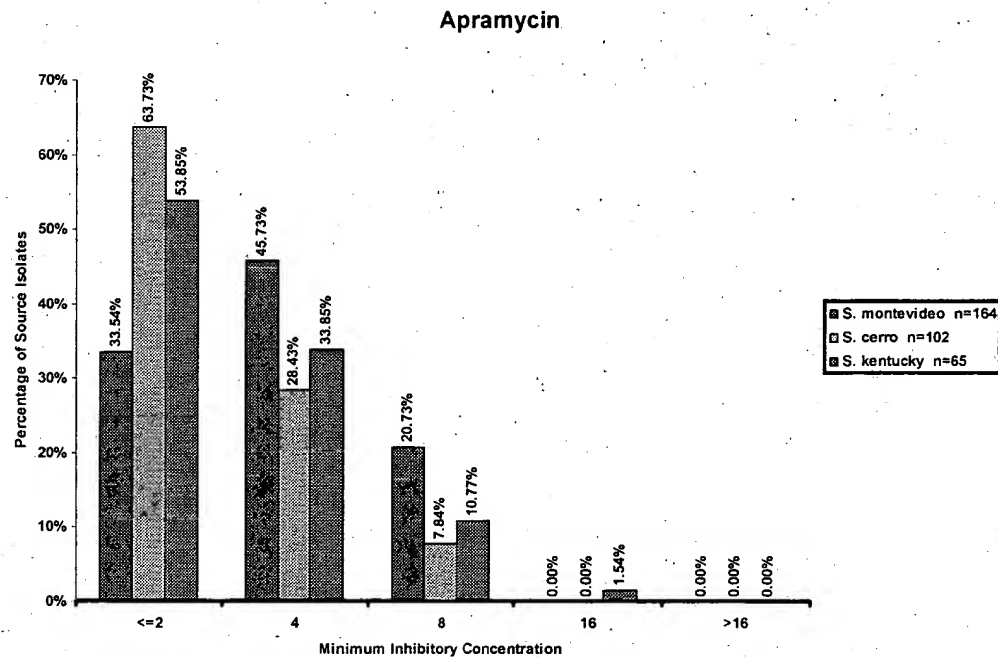


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

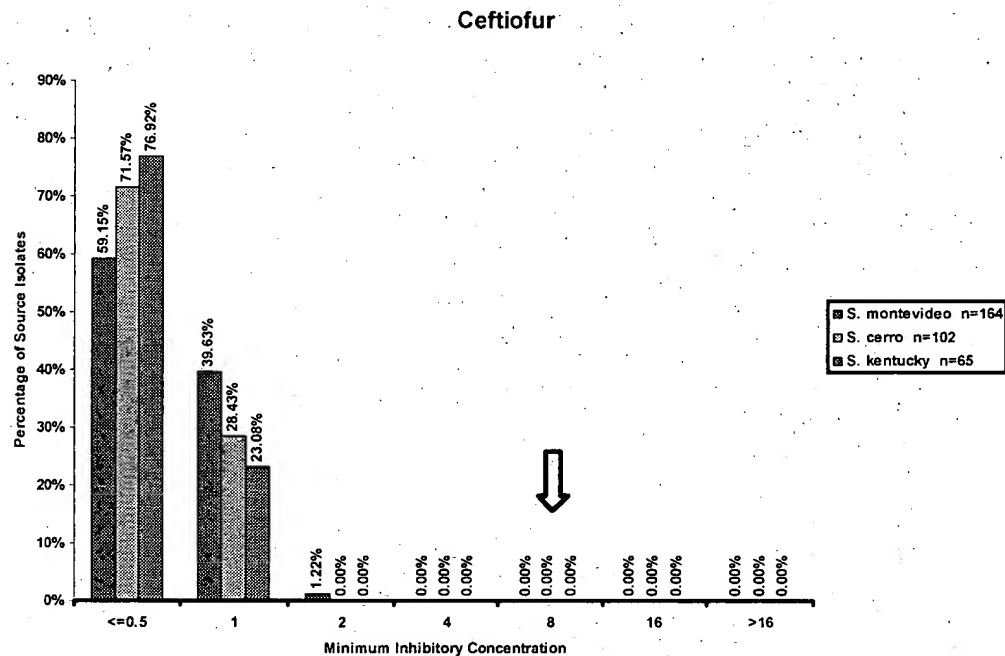


Breakpoint = 32

NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

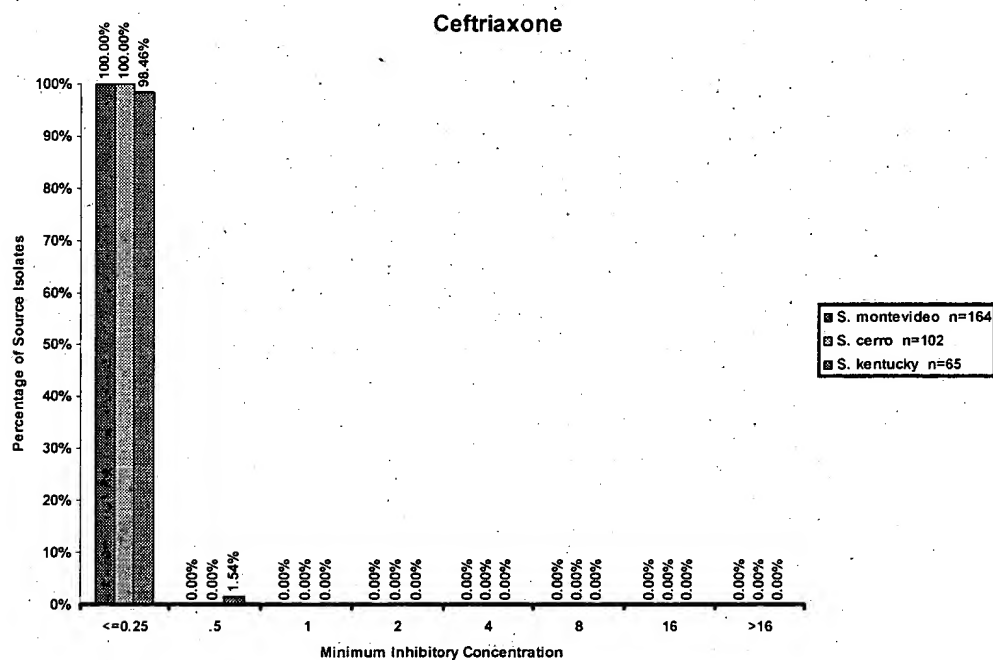


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

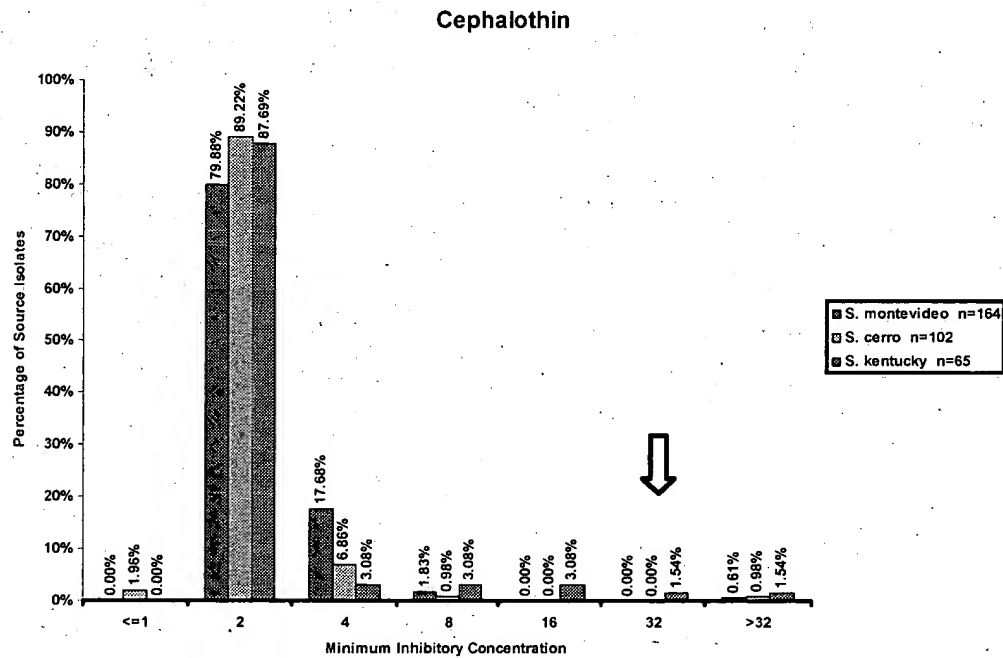


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

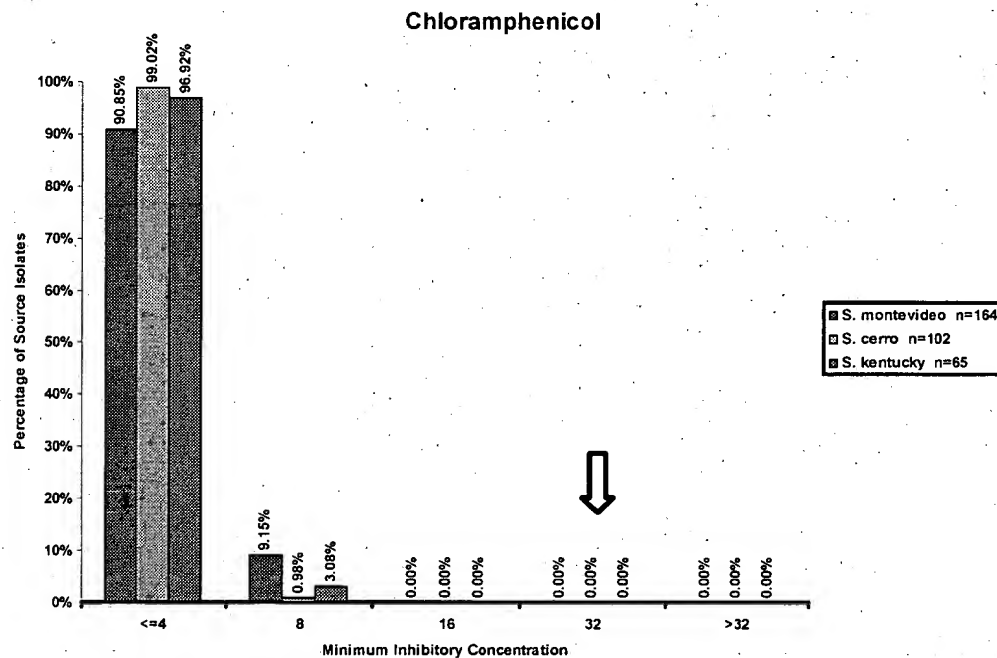


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

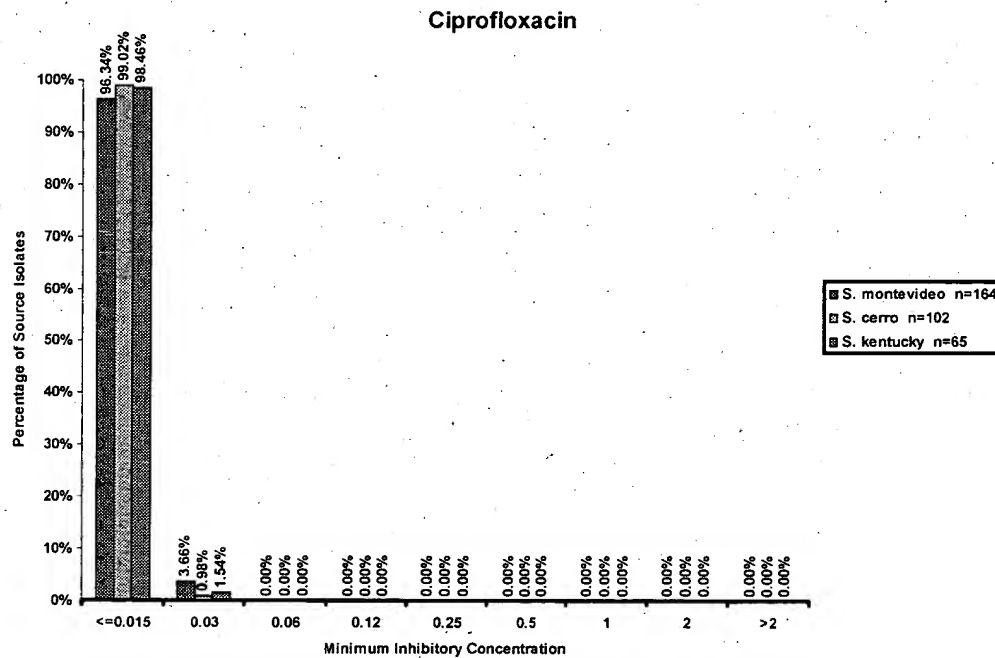


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

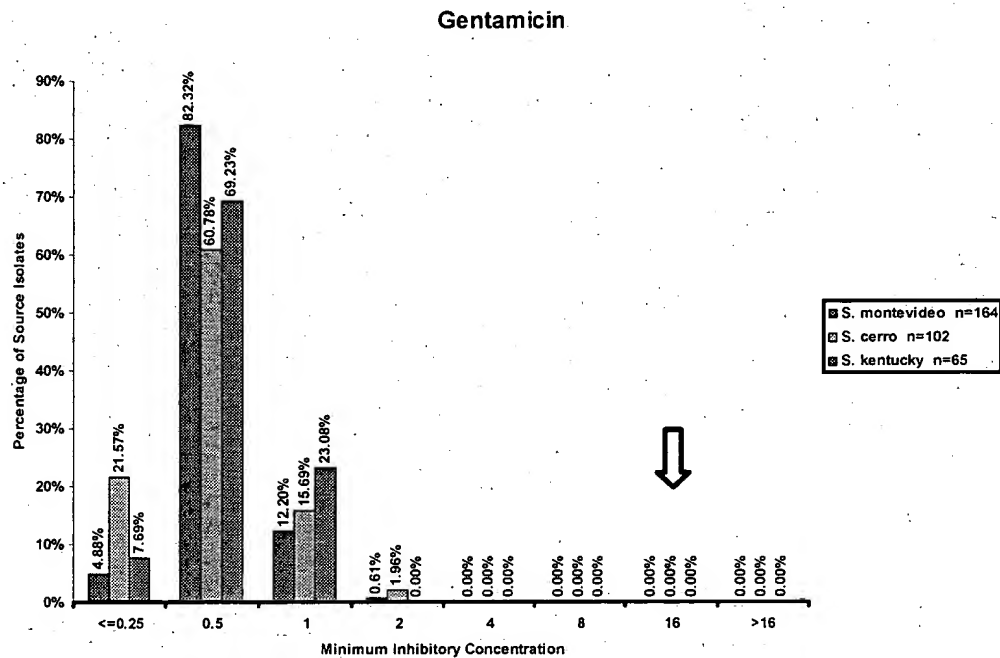


Breakpoint = 4

NARMS - EB 1997

Veterinary Isolates

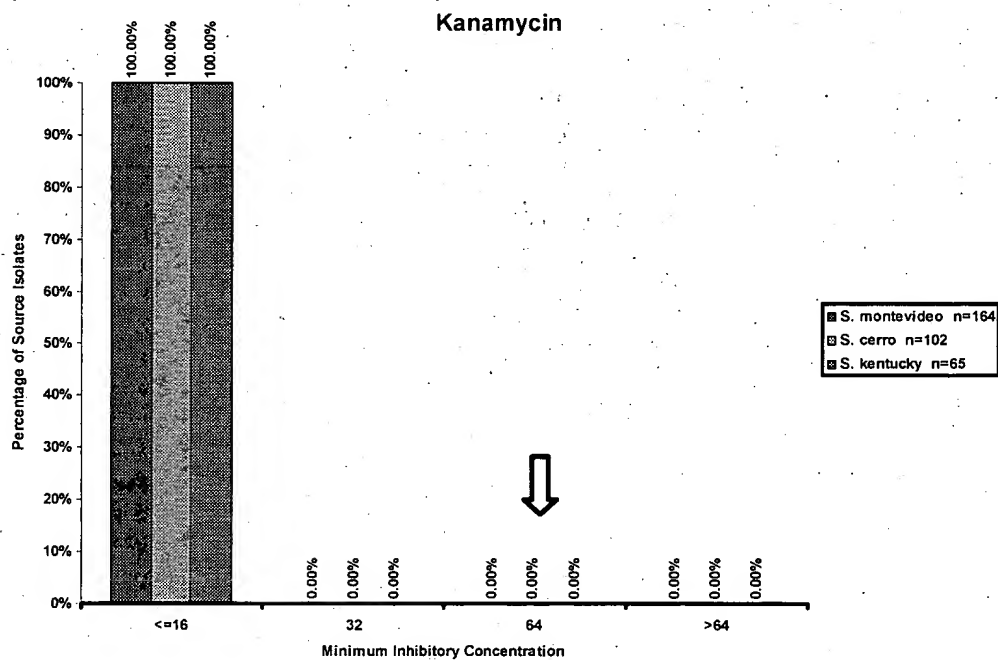
**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**



NARMS - EB 1997

Veterinary Isolates

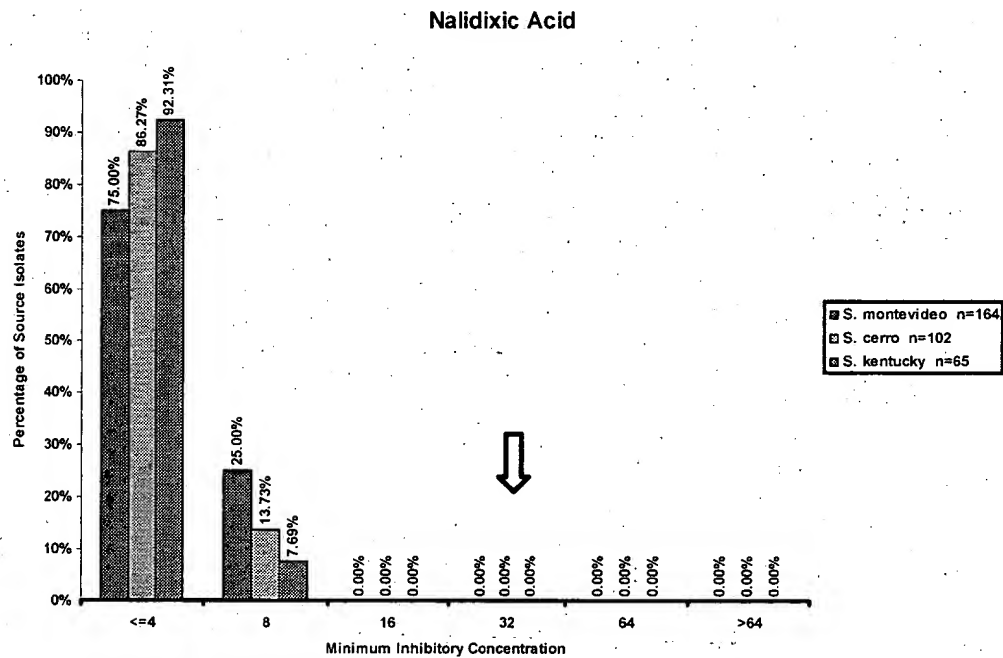
**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**



NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

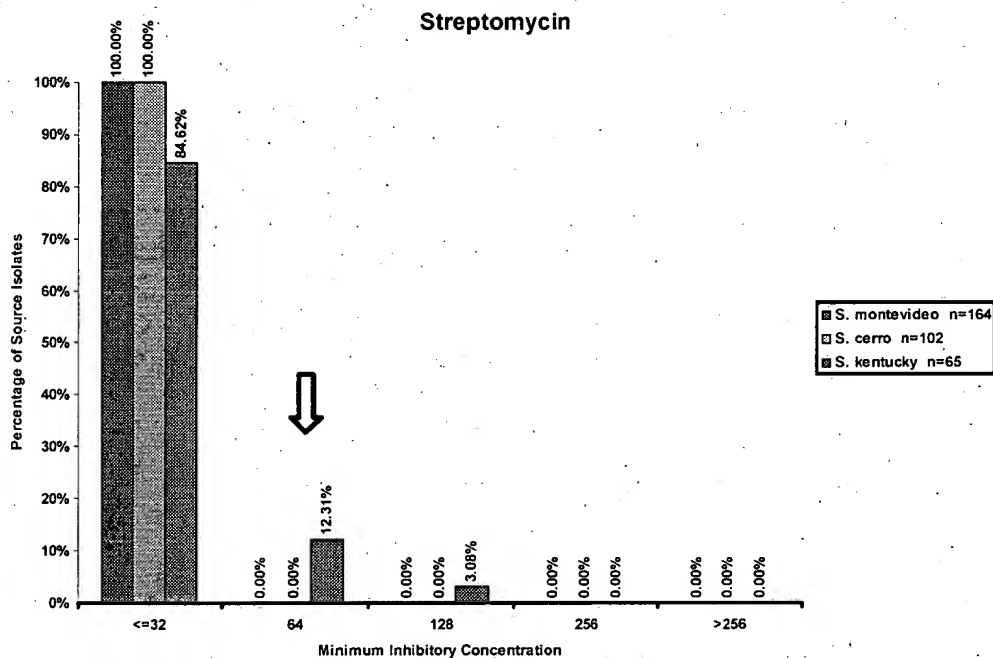


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

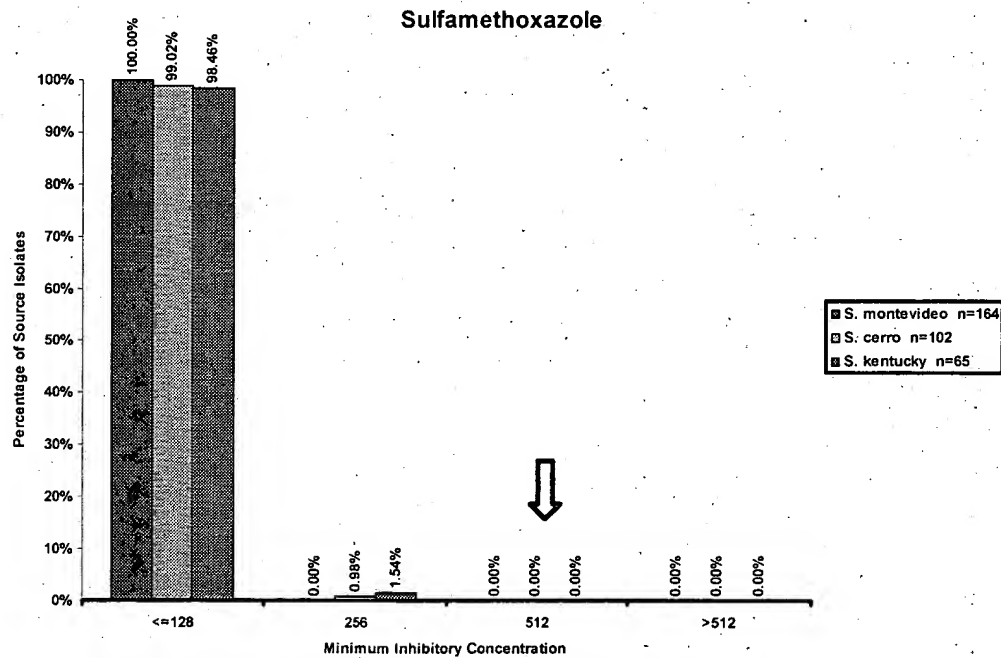


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

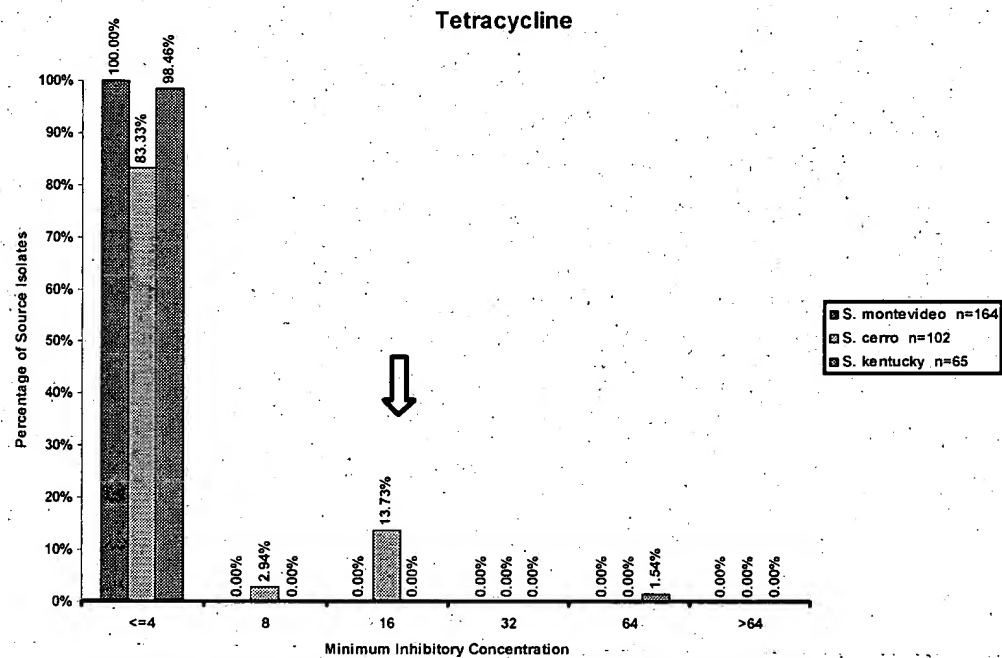


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

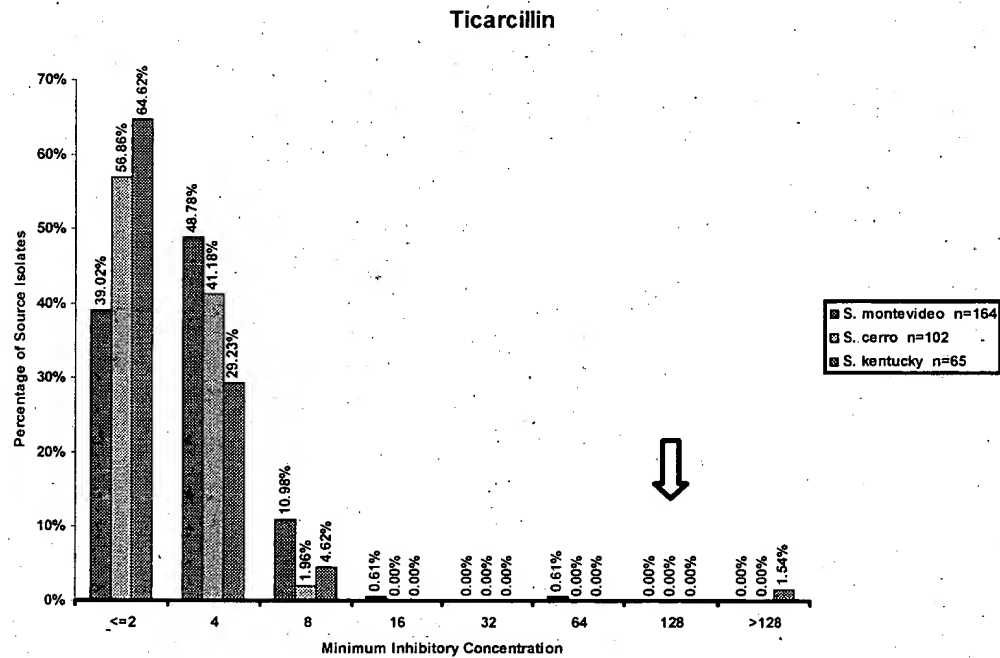


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

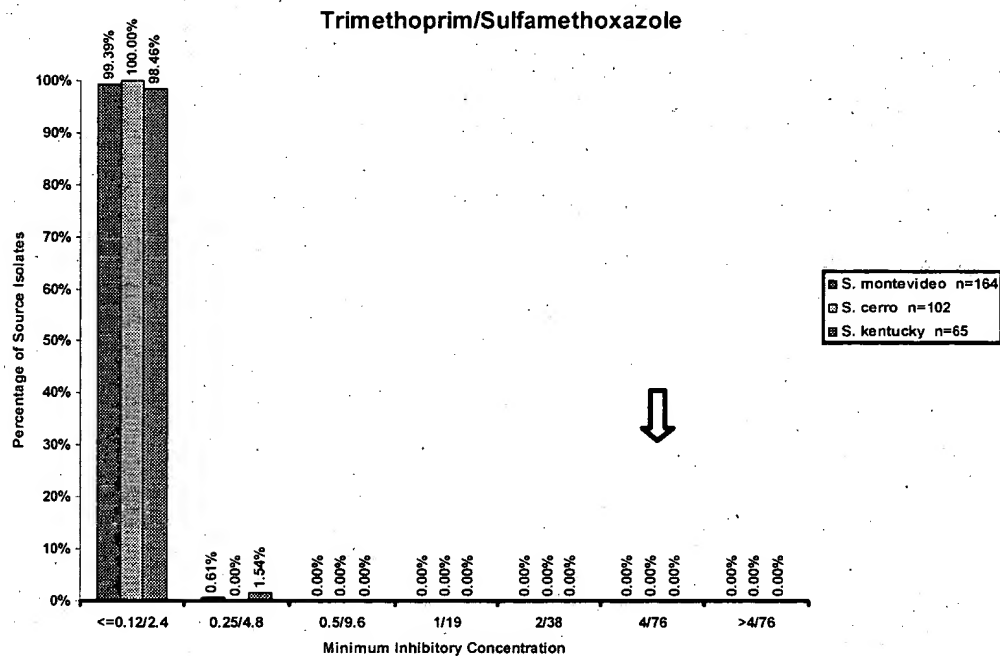


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 22. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical On Farm)**

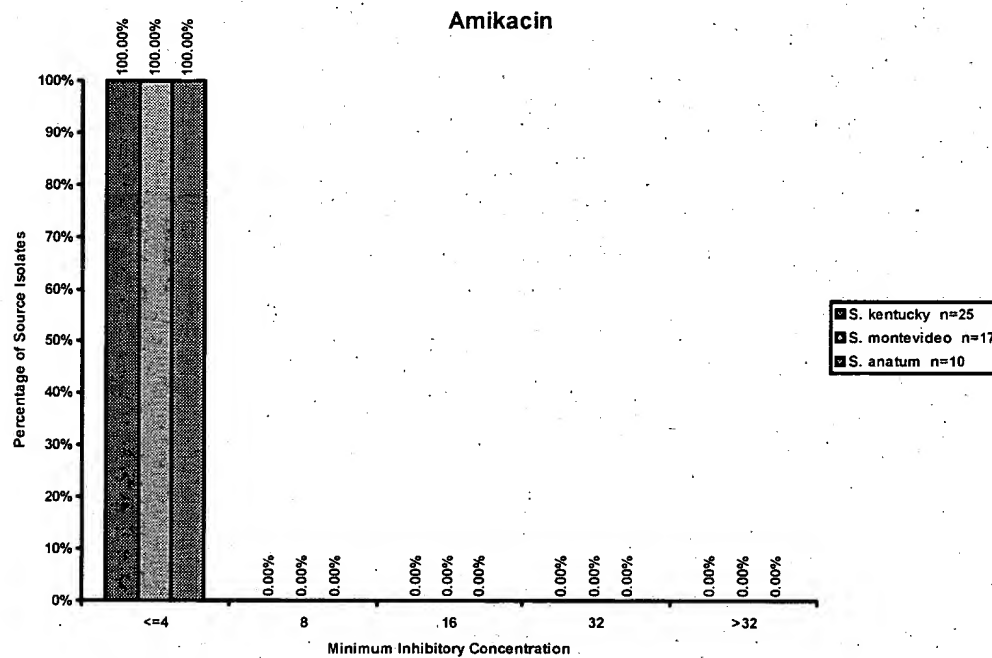


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NARMS - EB 1997

Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

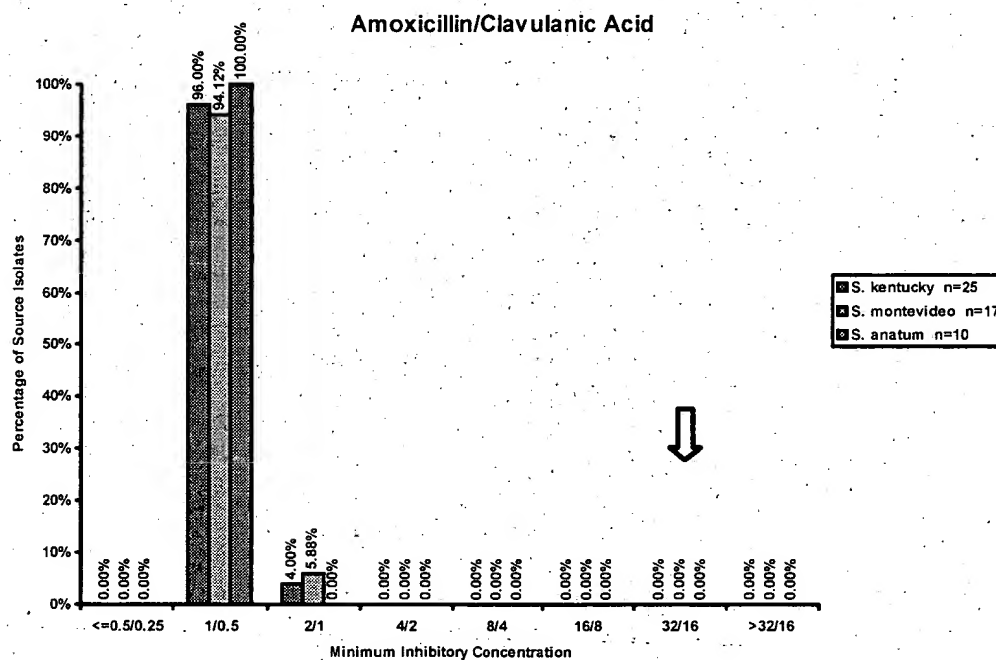


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

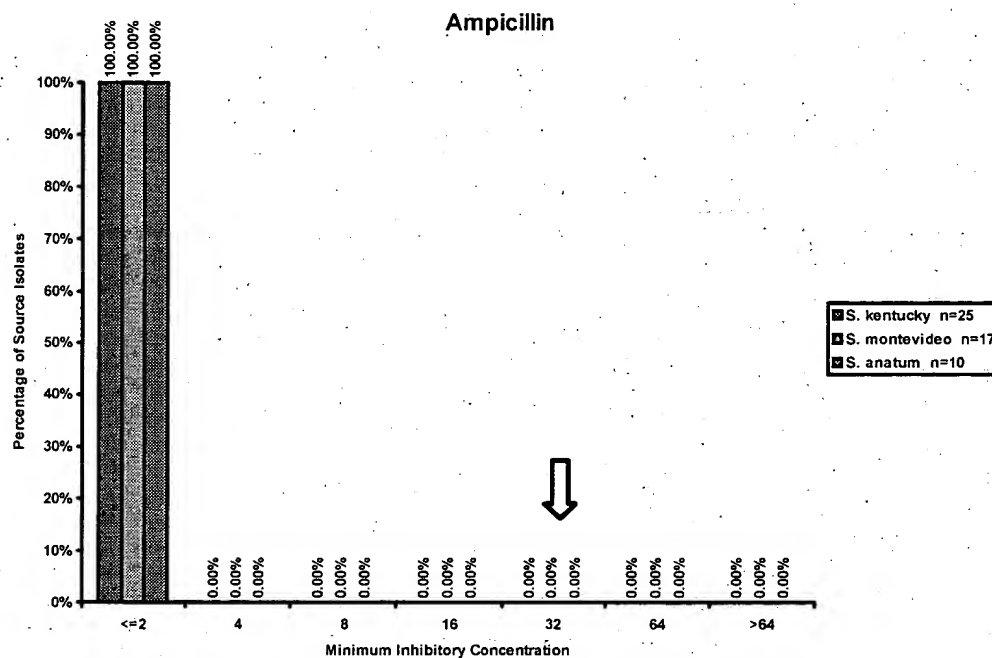


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

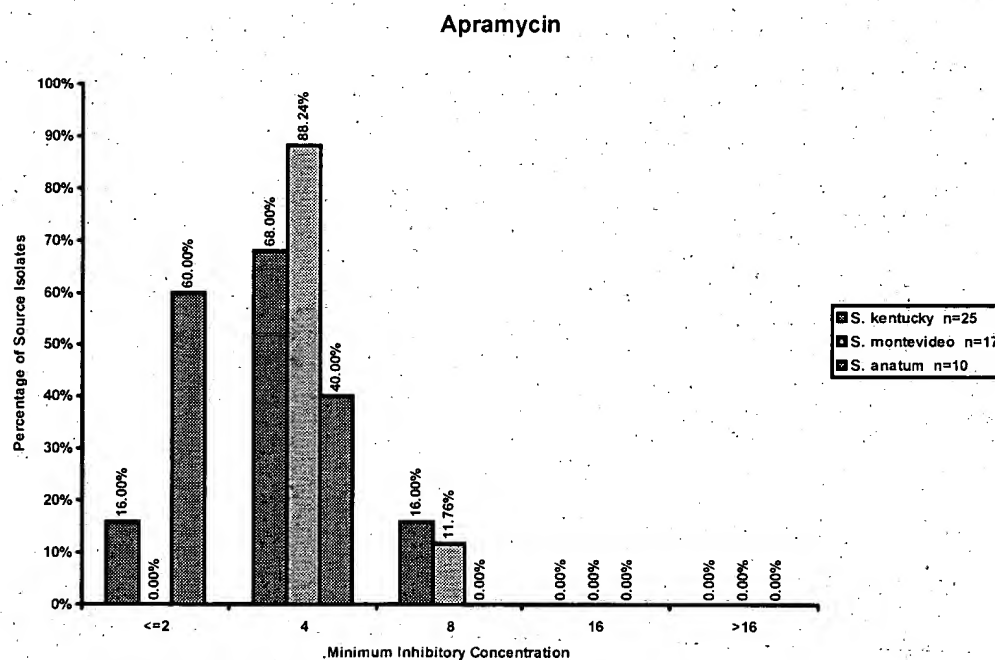


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NARMS - EB 1997

Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

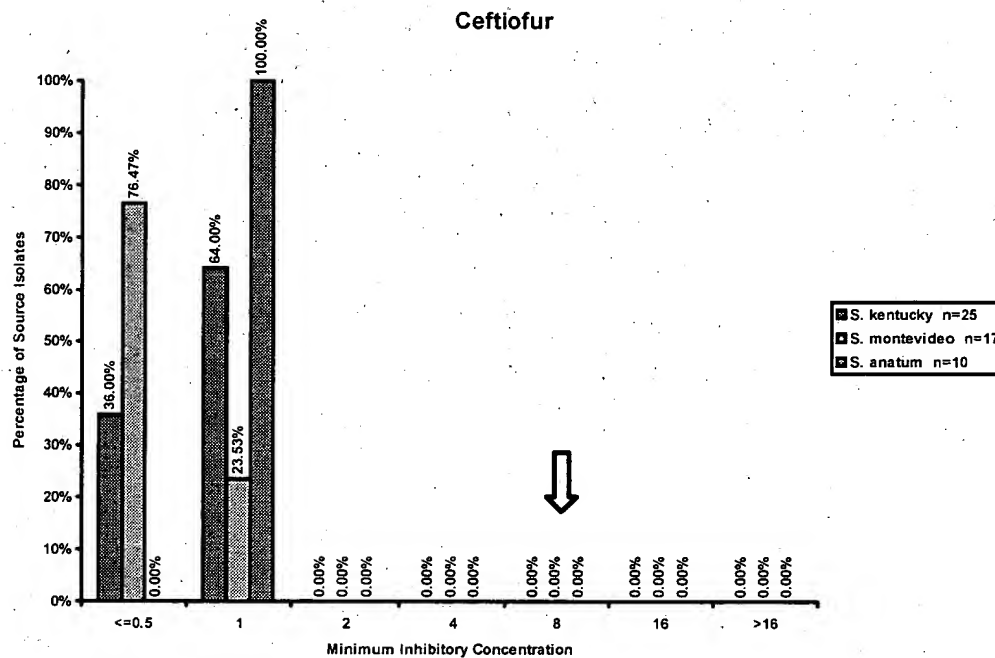


Breakpoint = 32

NARMS - EB 1997

Veterinary Isolates

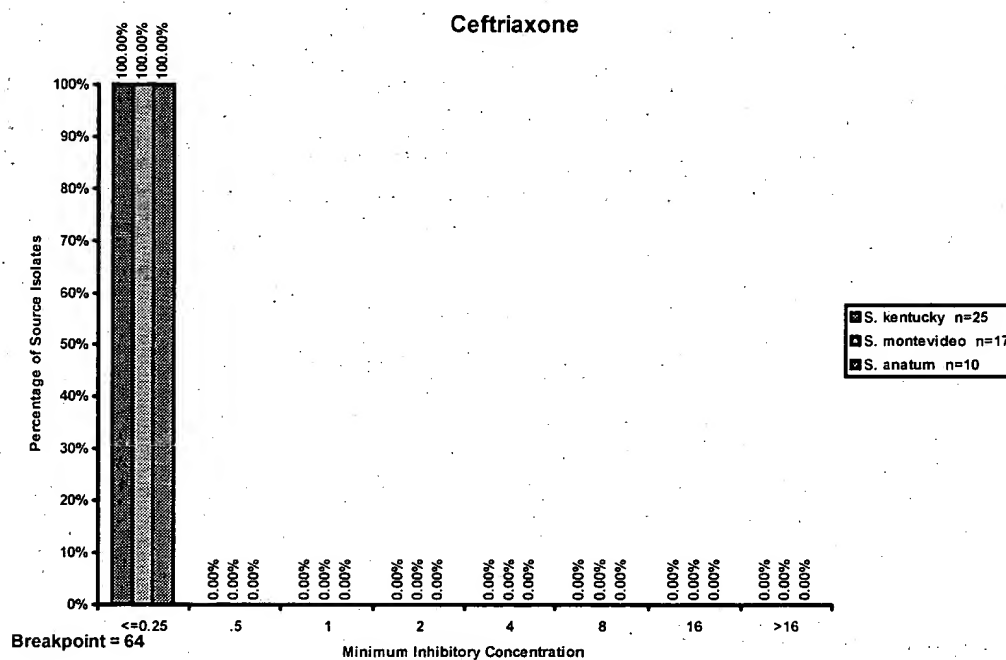
**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**



↓ Breakpoint

NARMS - EB 1997 Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

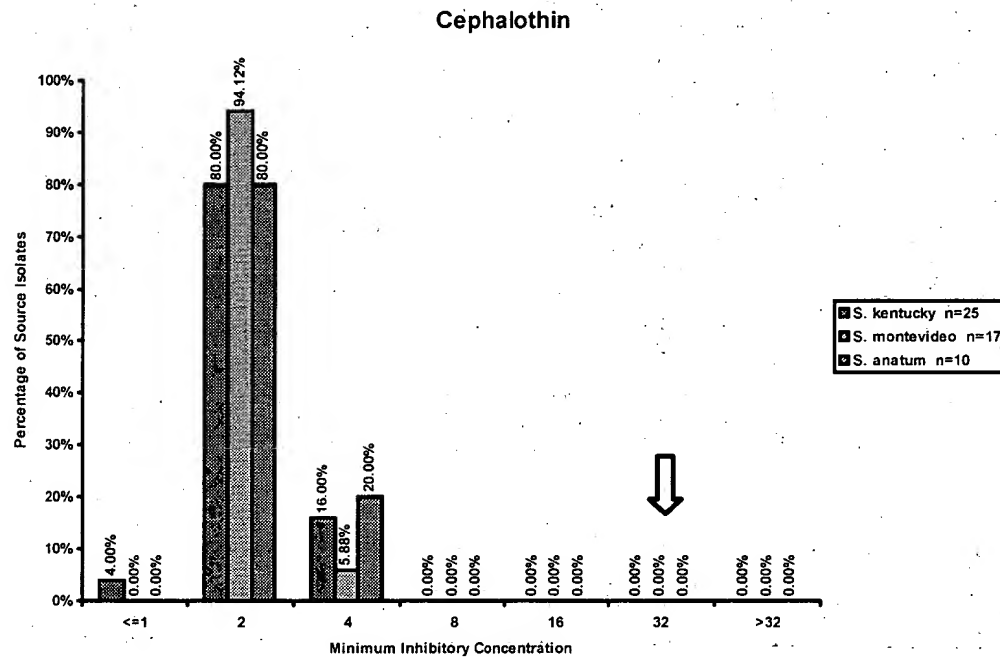


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

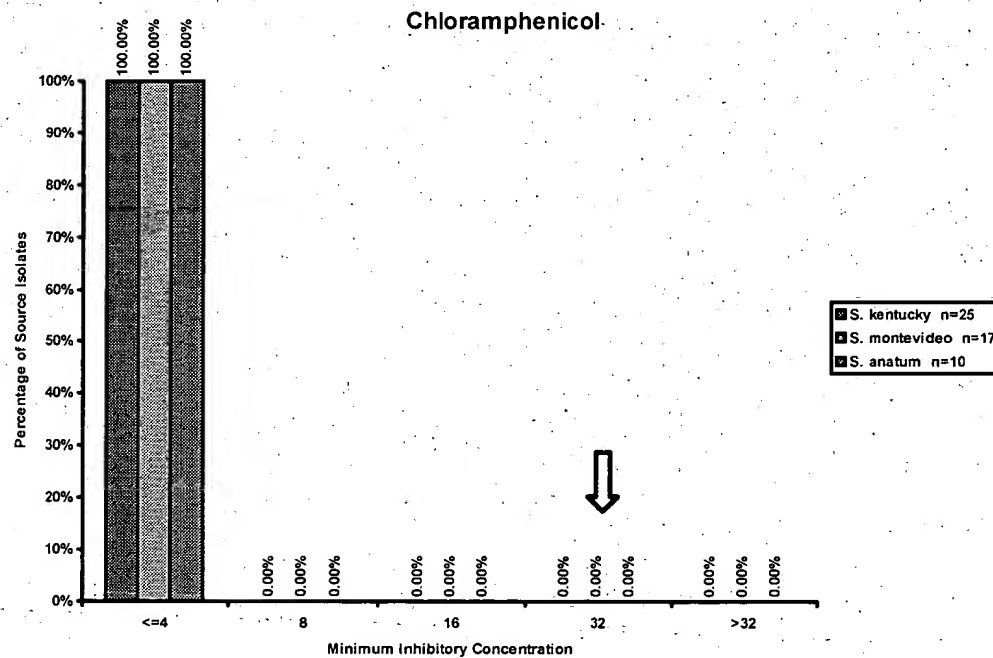


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

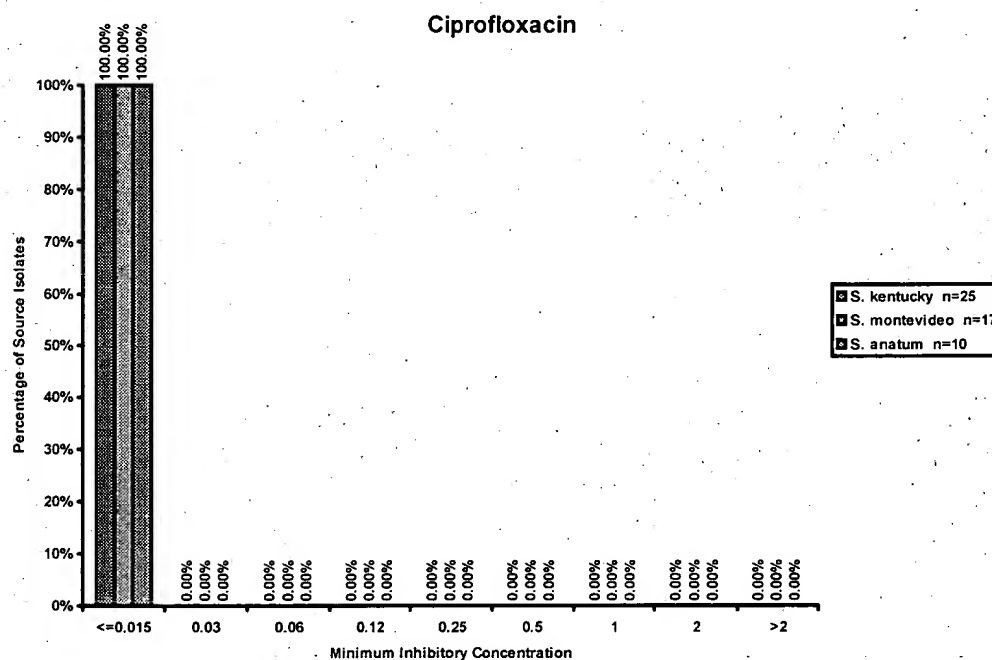


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

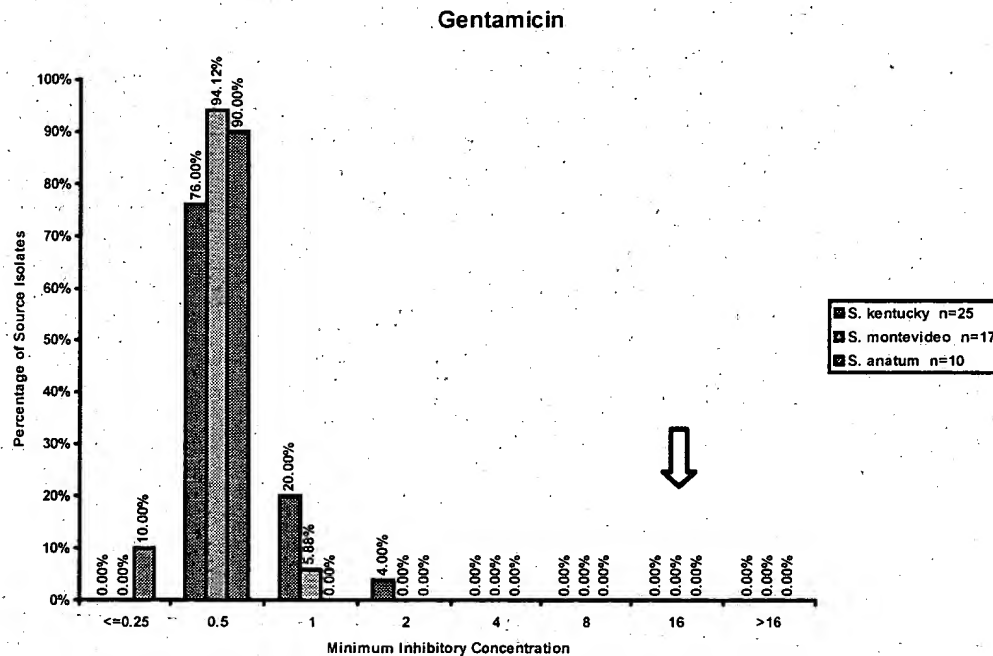


Breakpoint = 4

NARMS - EB 1997

Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

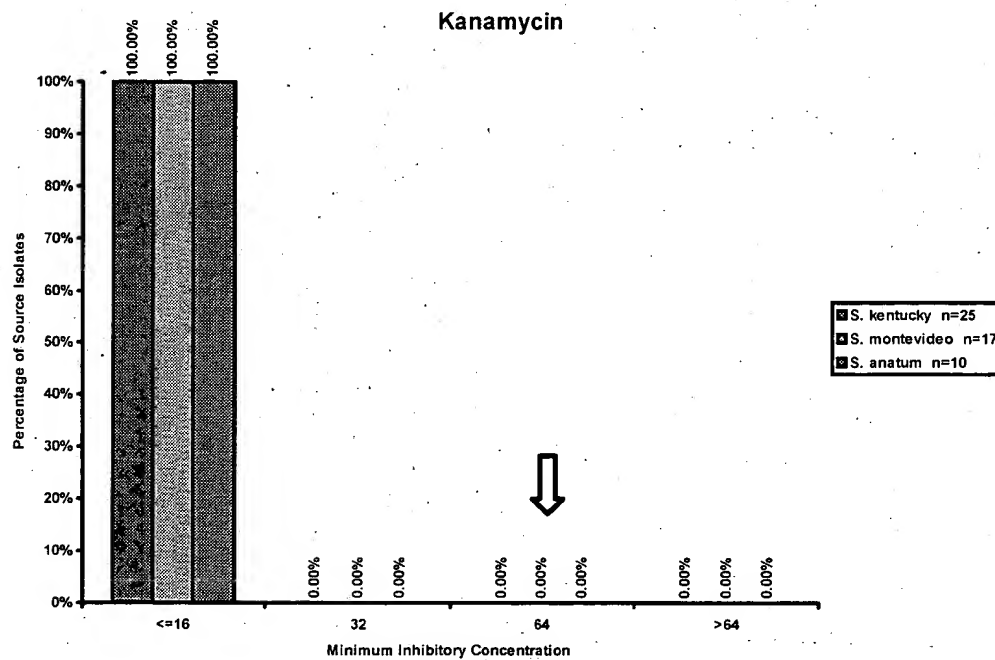


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

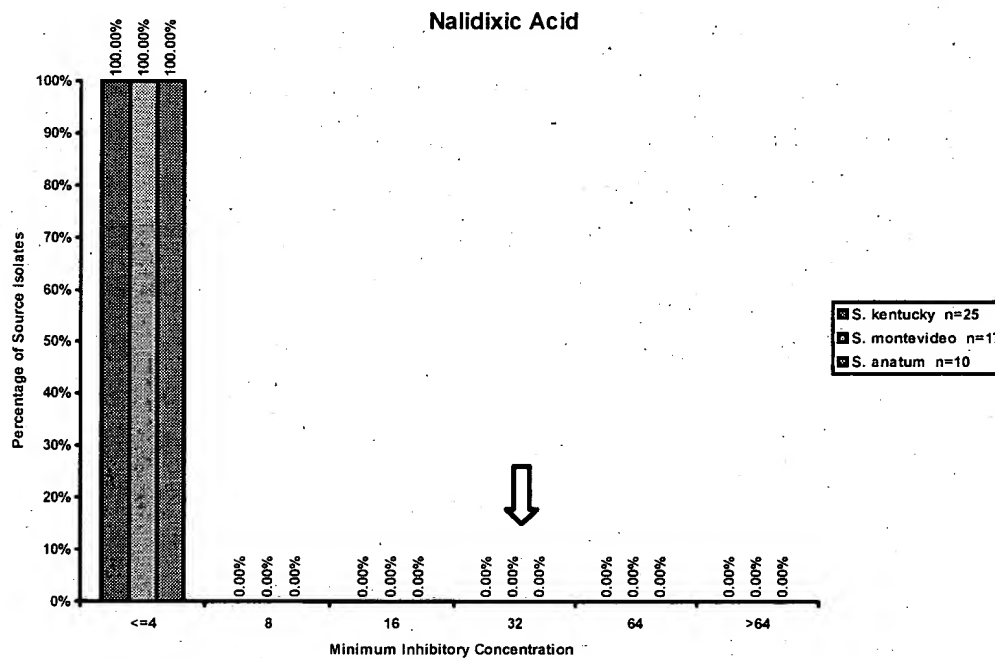


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

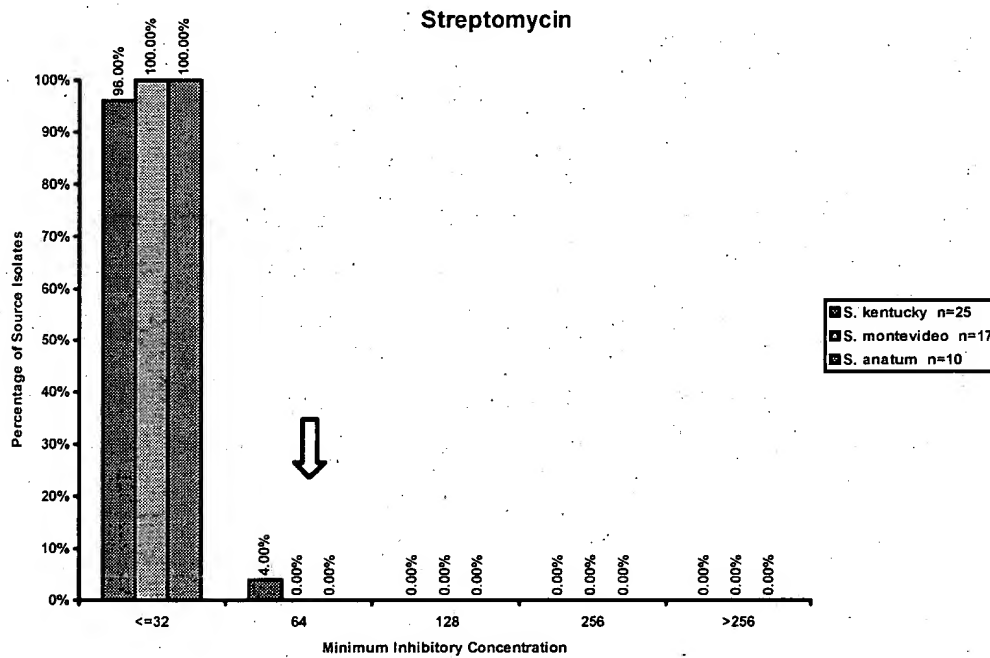
**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**



NARMS - EB 1997

Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

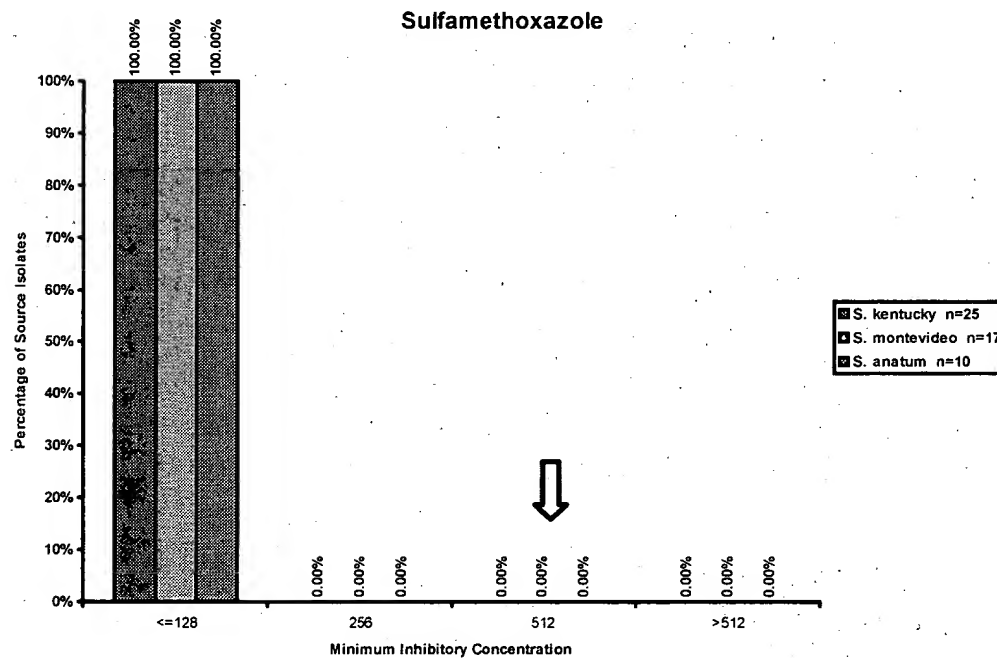


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

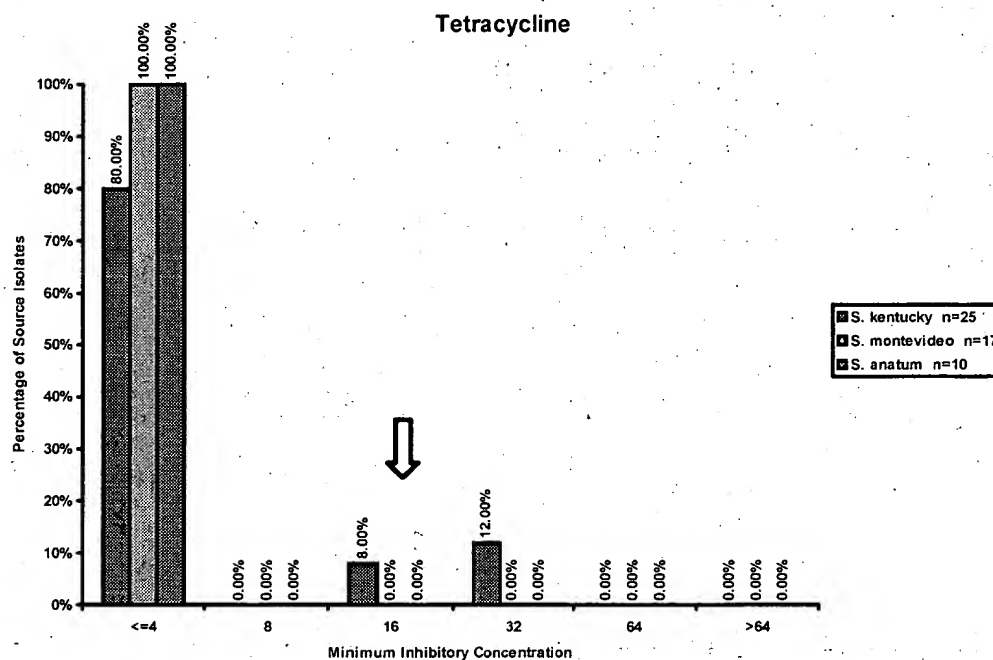


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

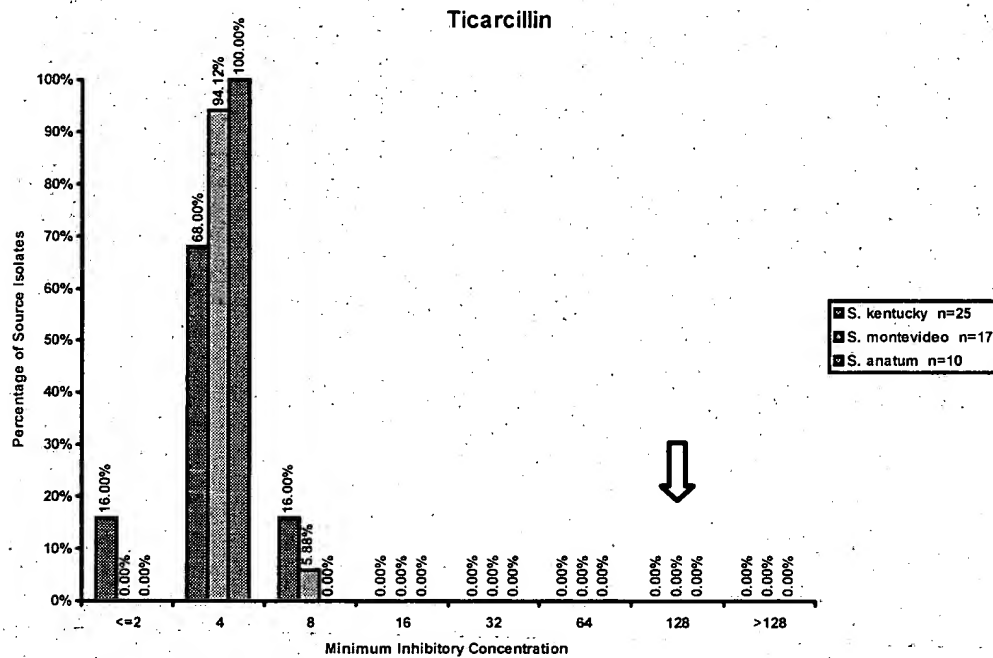


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

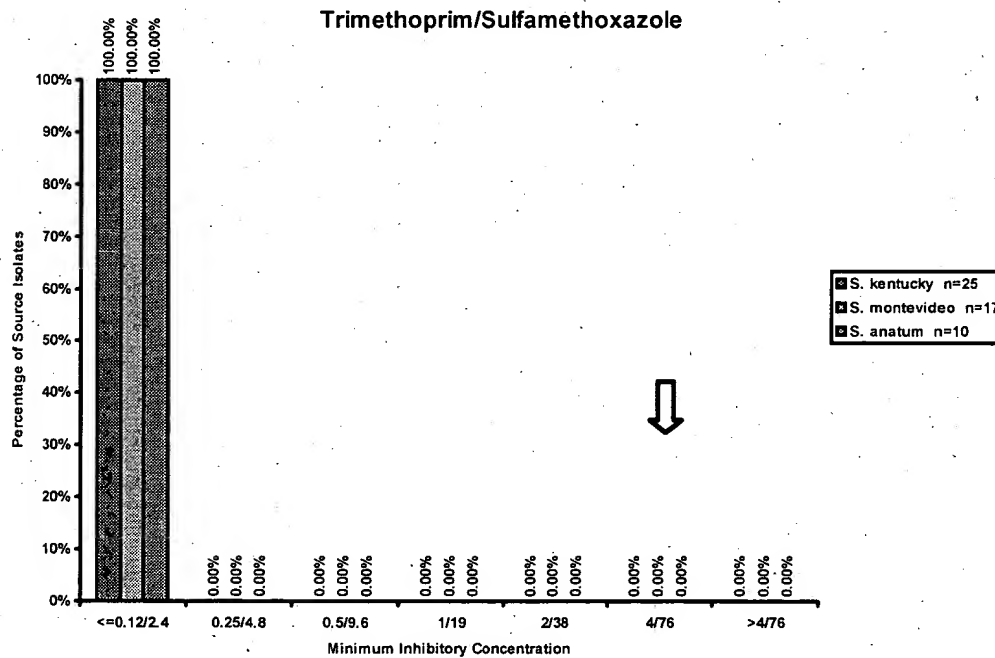


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 23. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes in Dairy Cattle (Non-Clinical - Cull)**

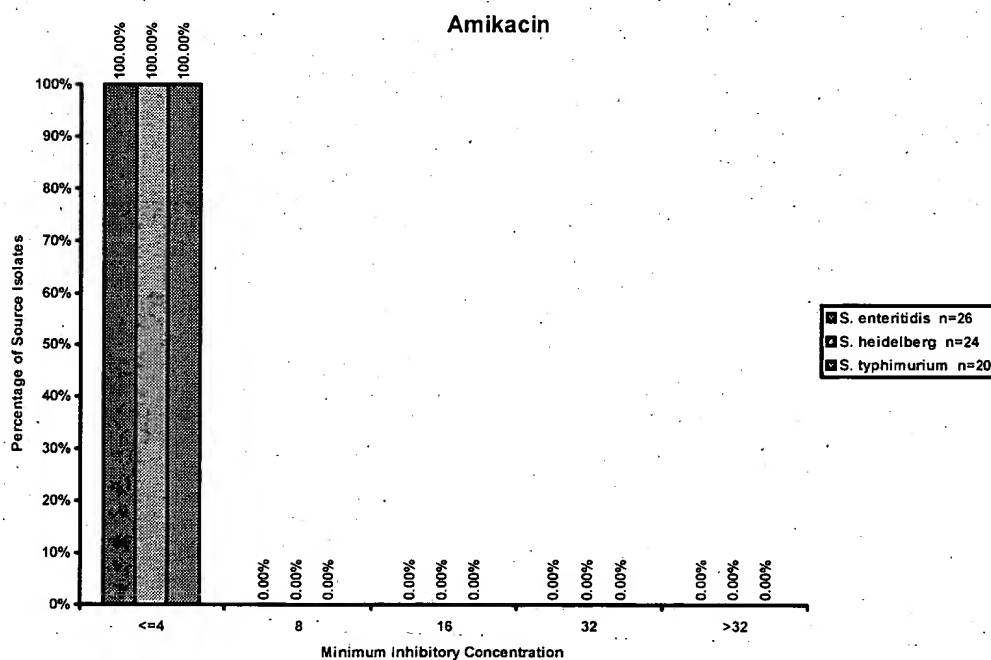


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

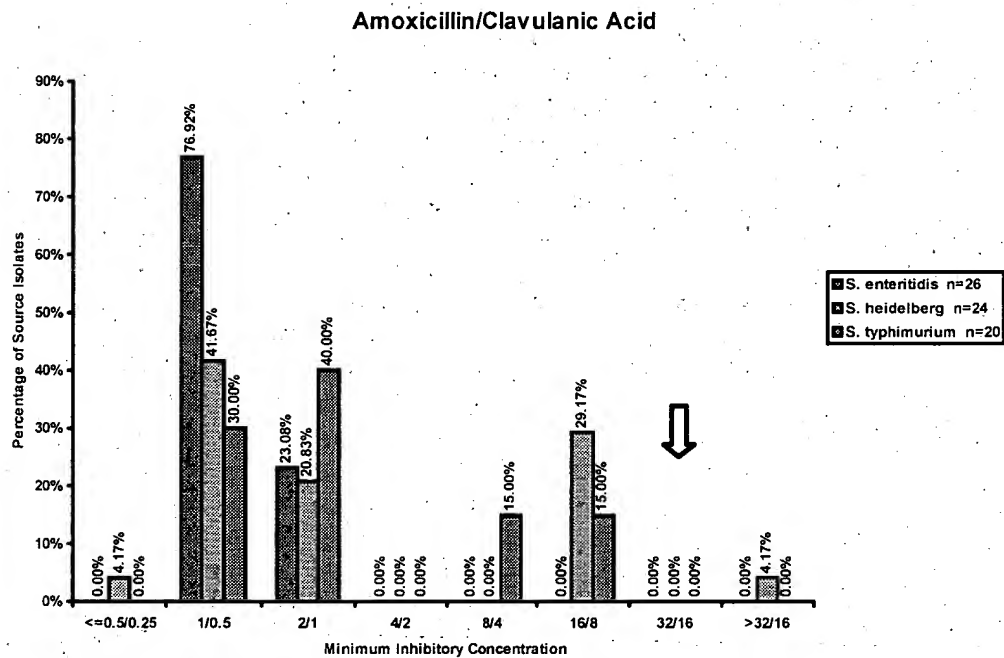


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

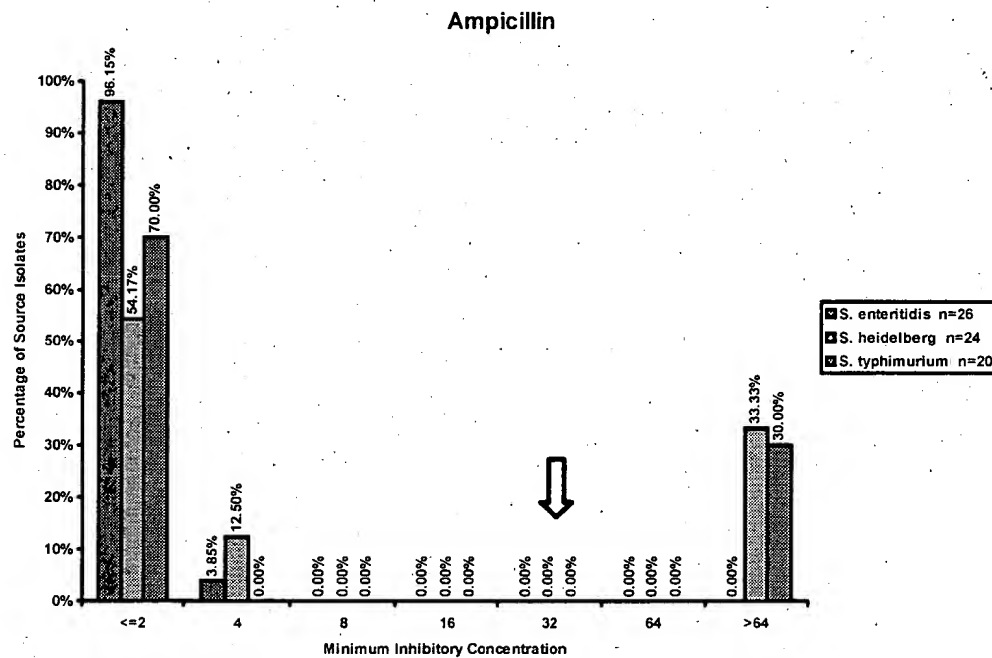


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

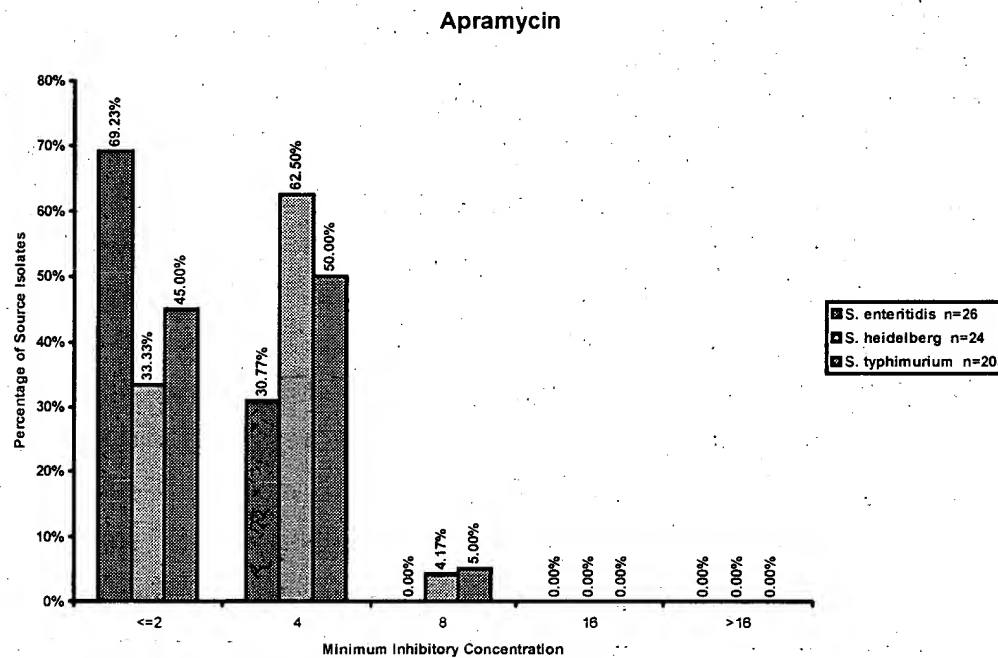


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

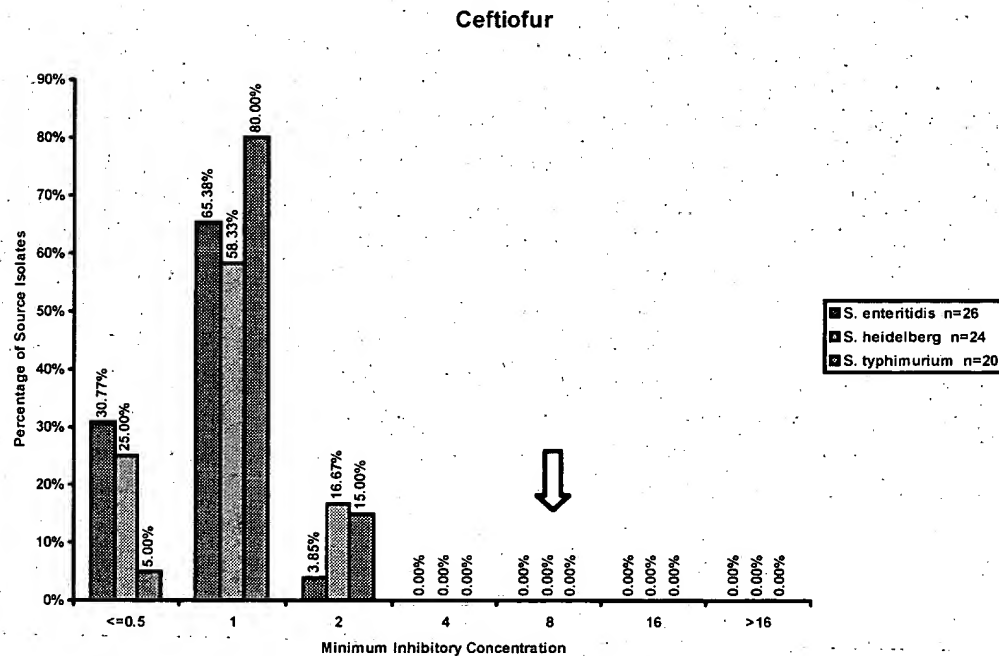


Breakpoint = 32

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

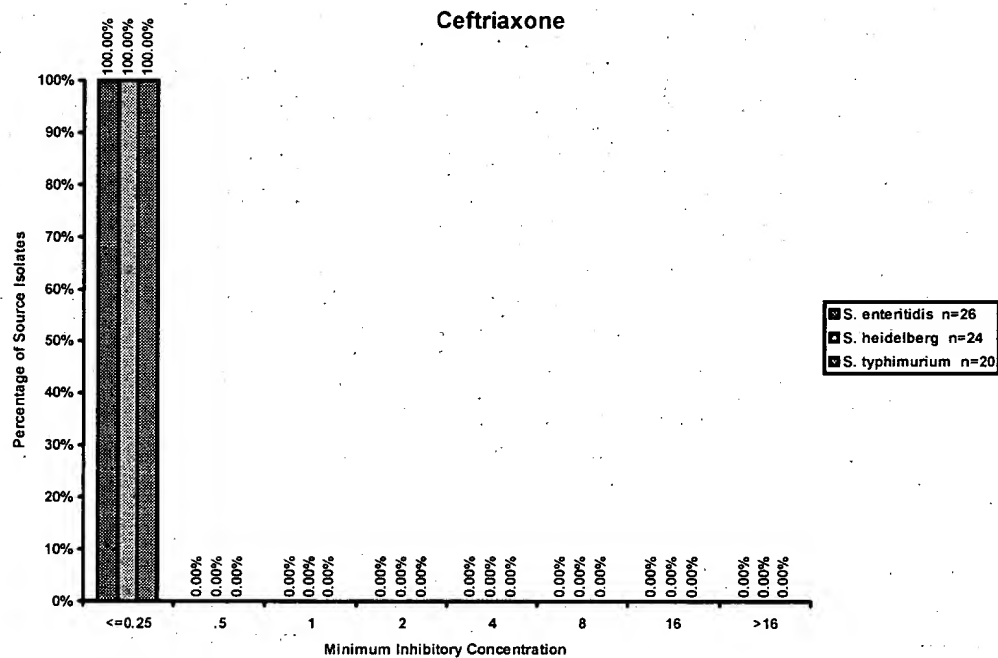


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

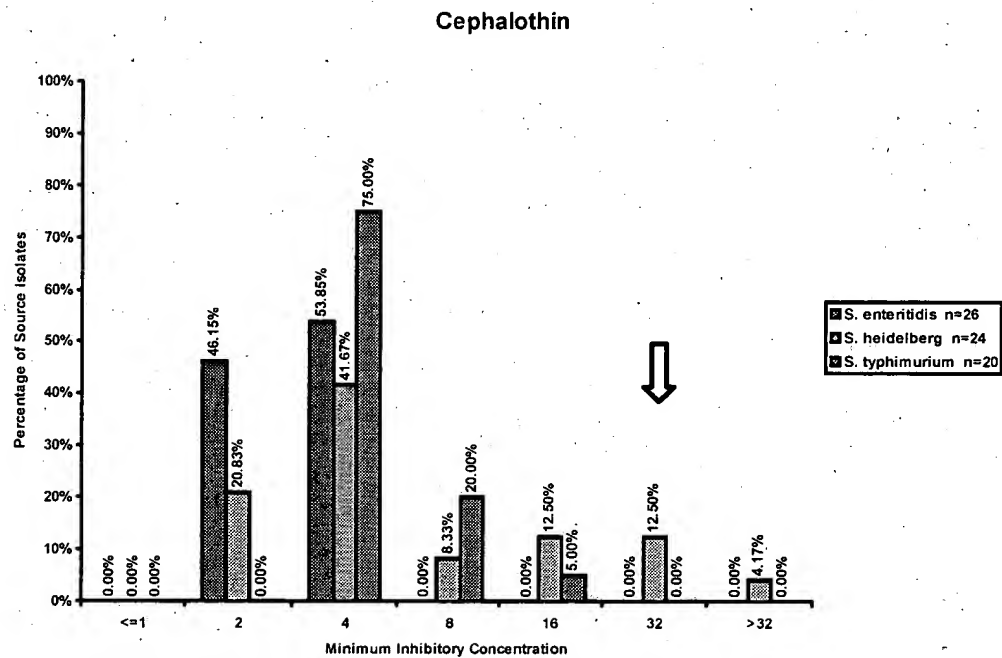


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

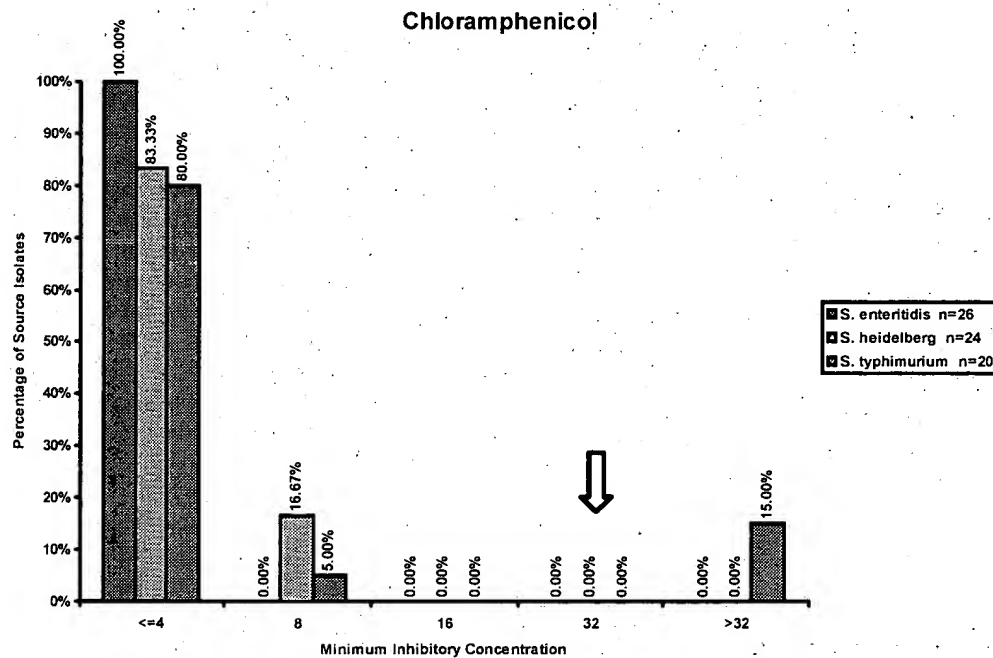


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

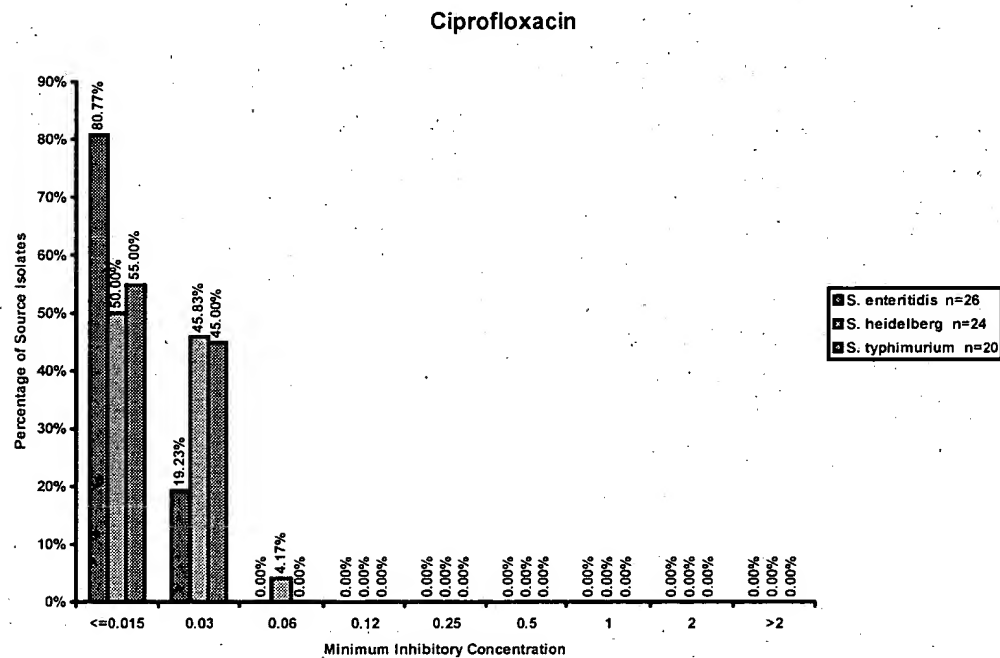


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

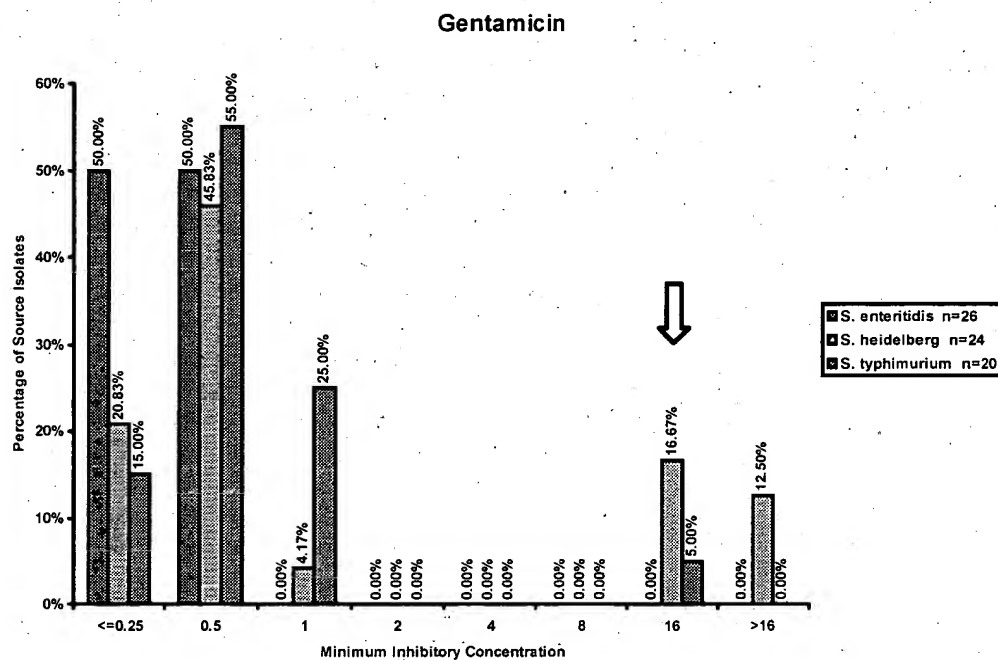


Breakpoint = 4

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

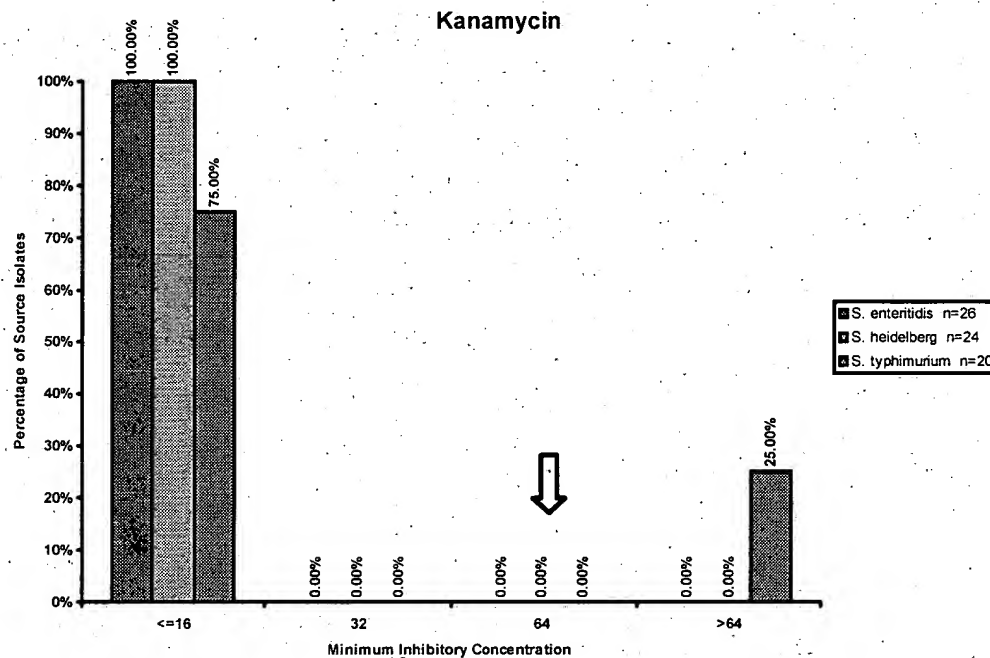


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

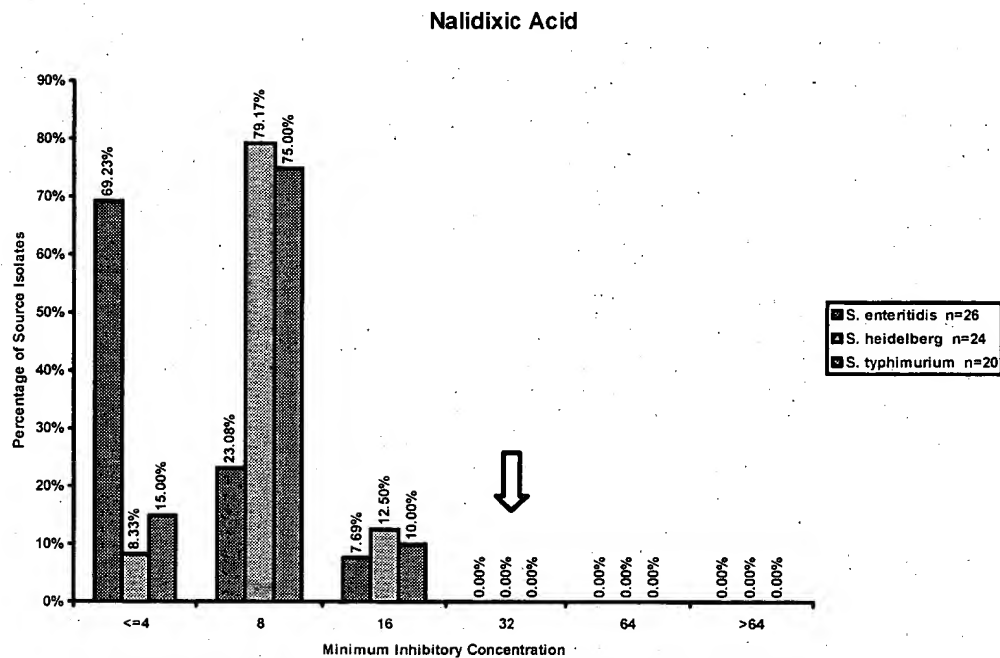


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

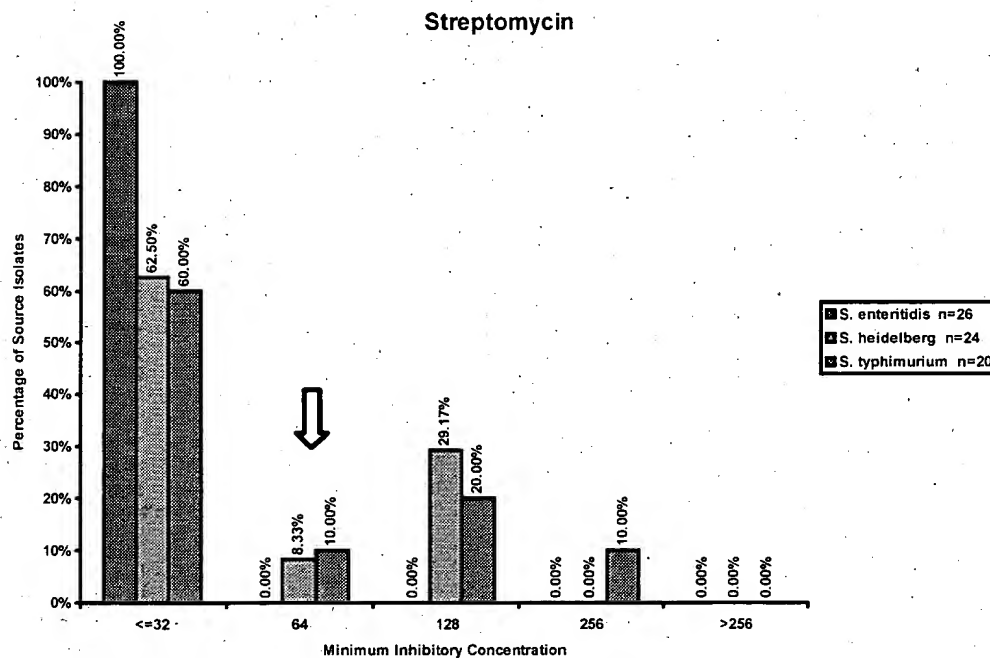


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

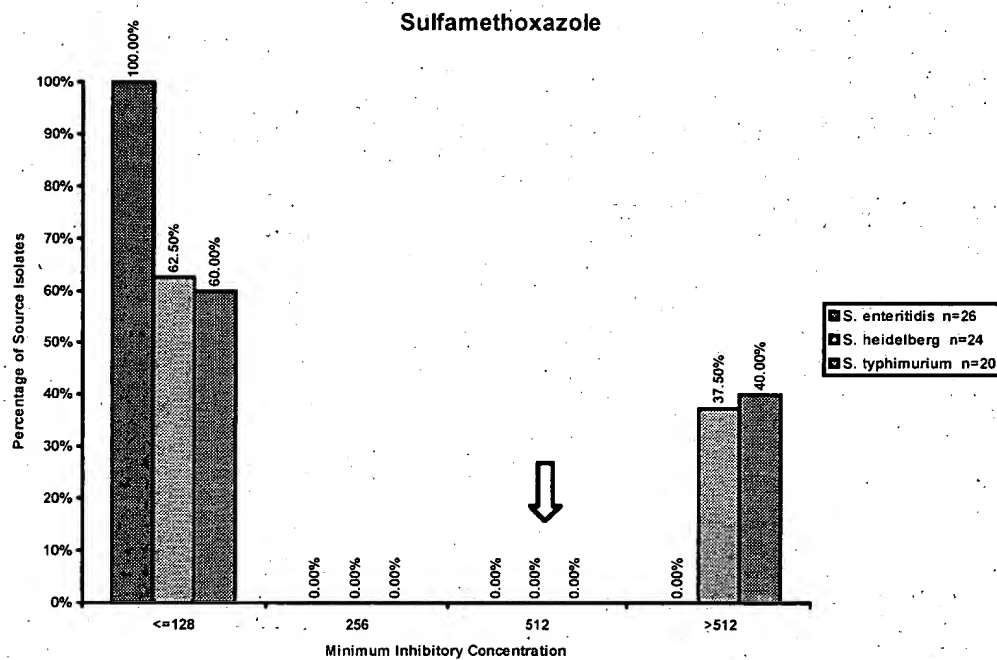


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

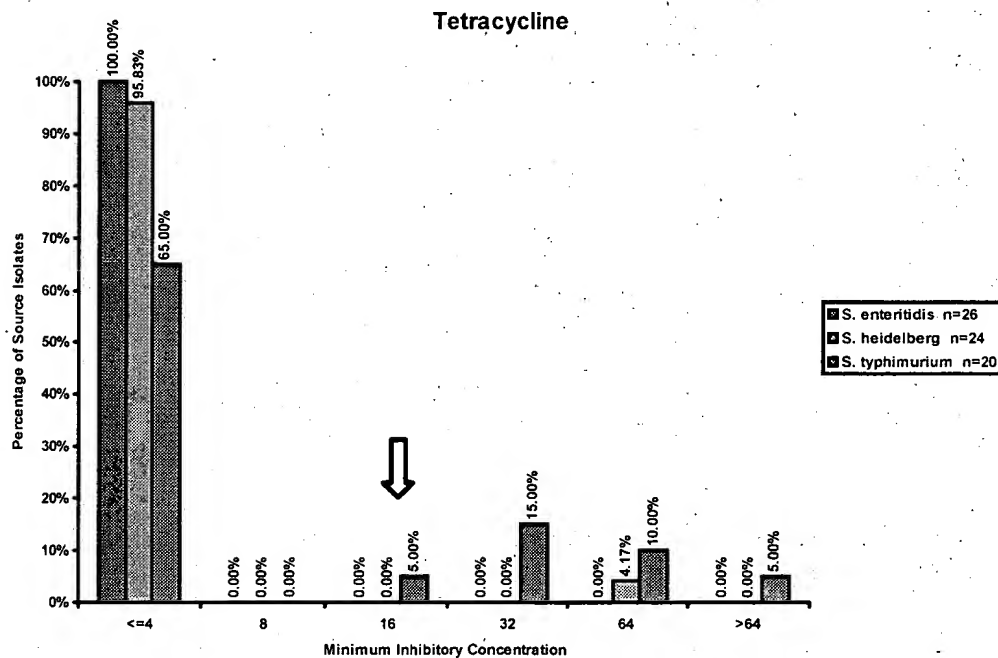


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

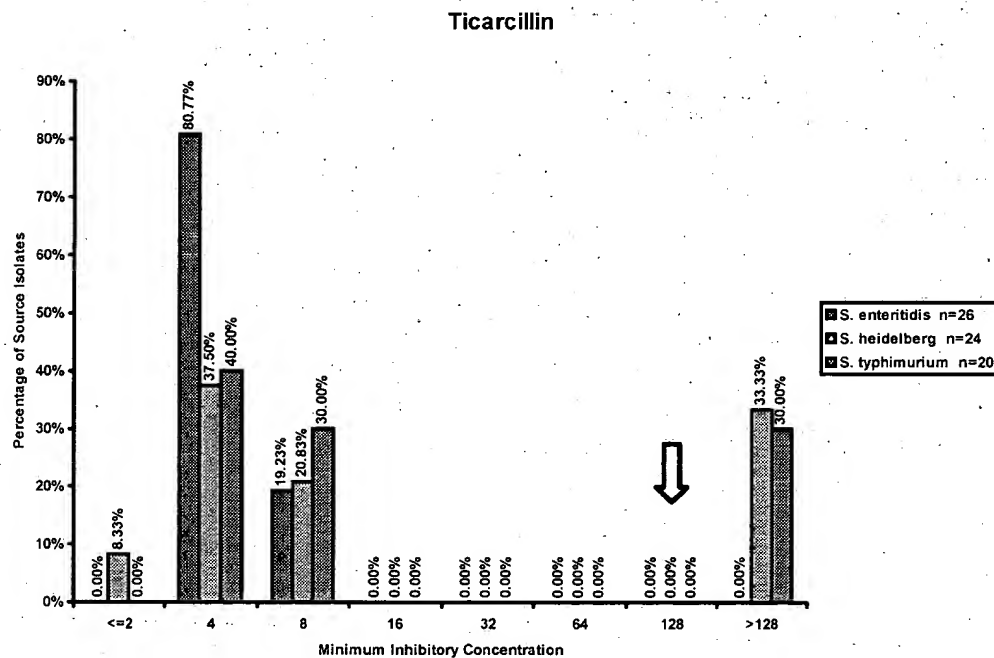


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

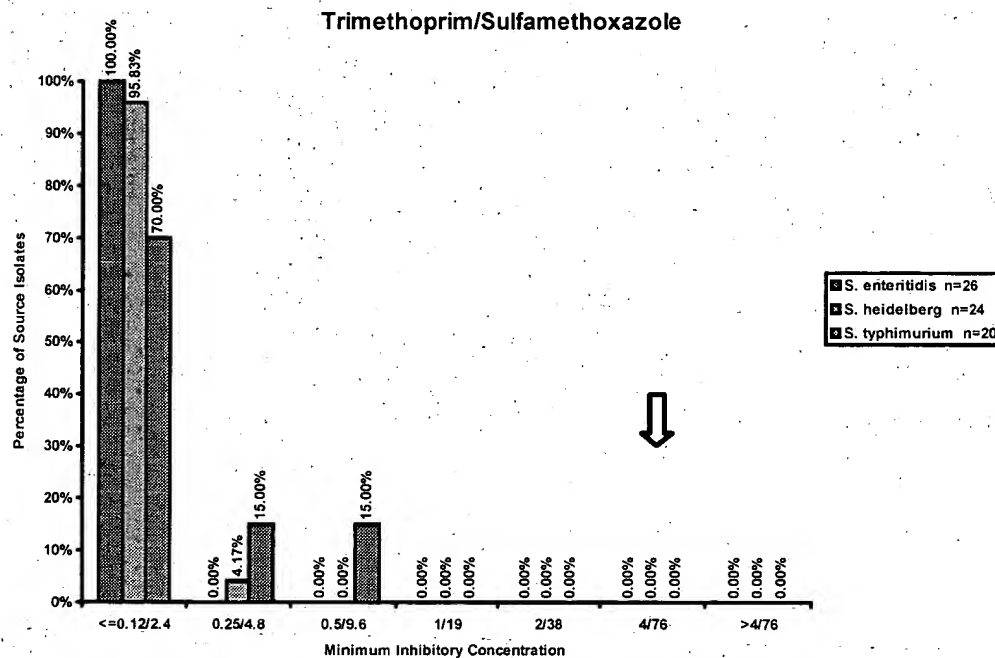


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 24. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Diagnostic)**

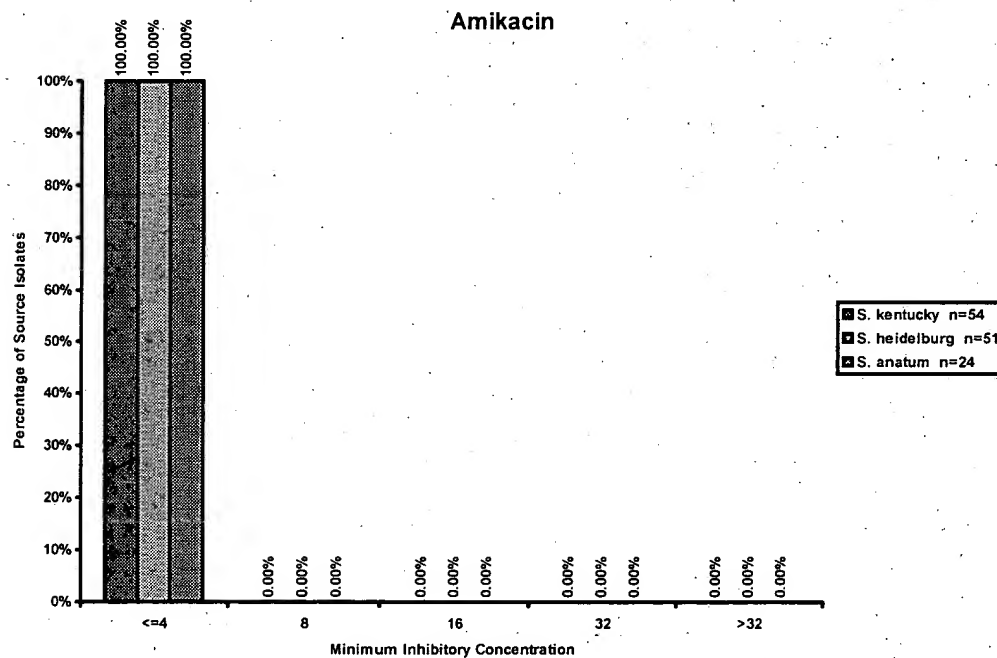


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

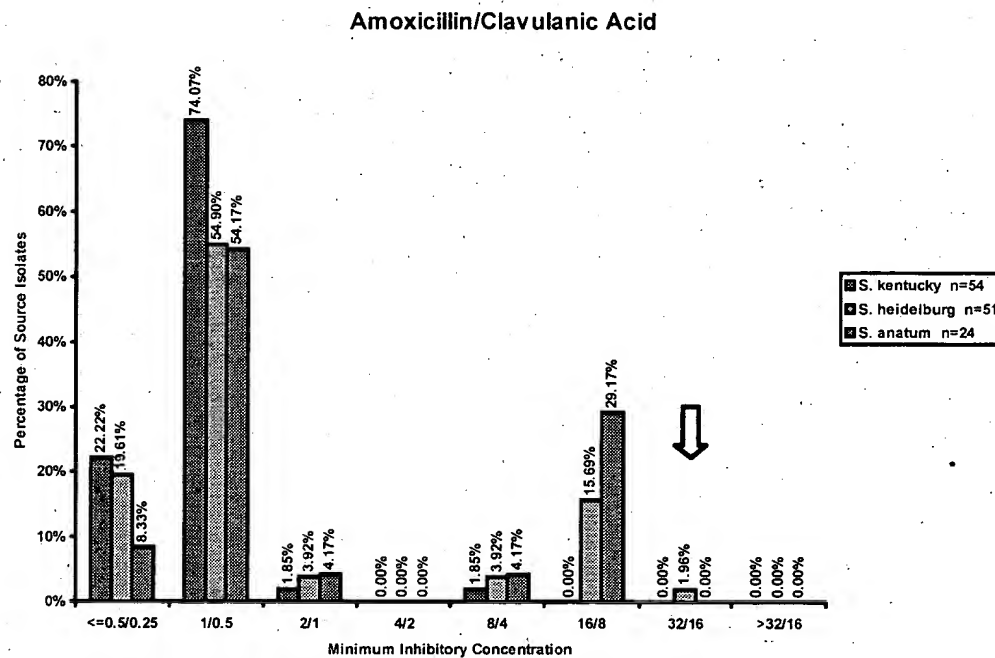


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

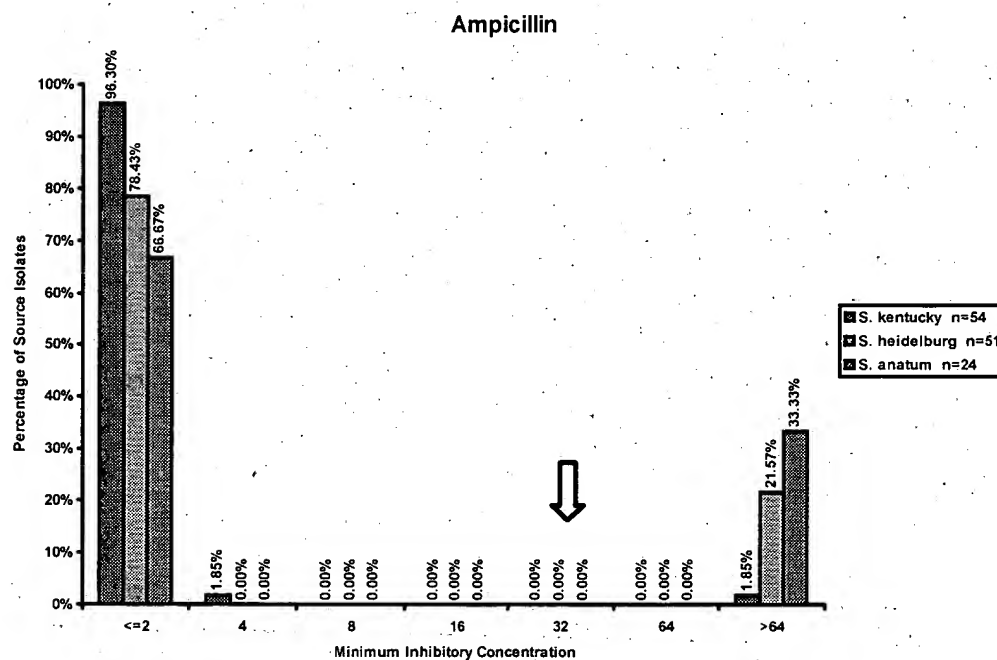


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

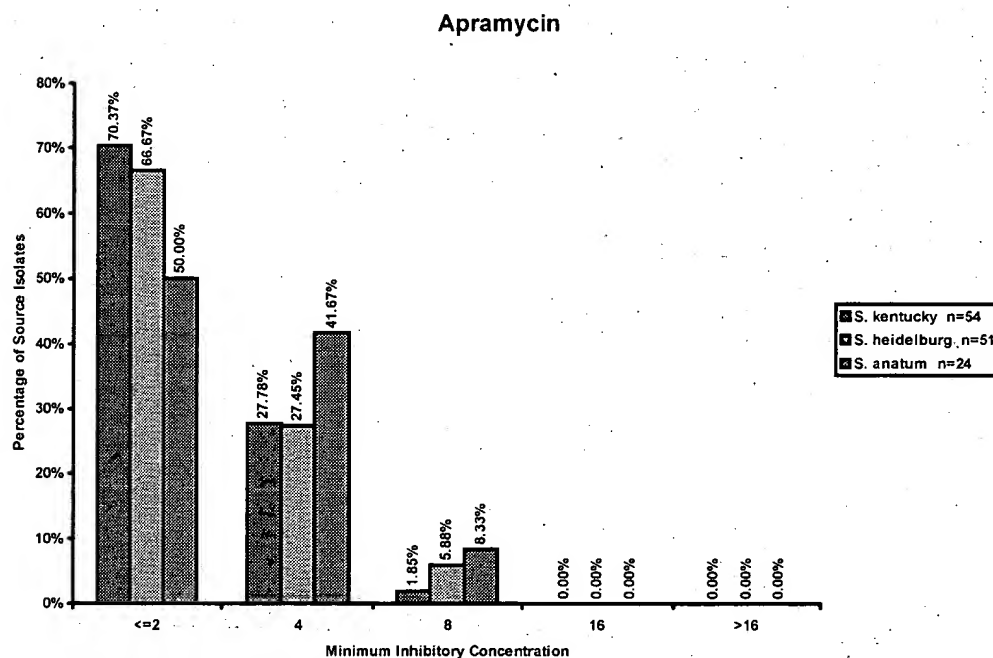


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

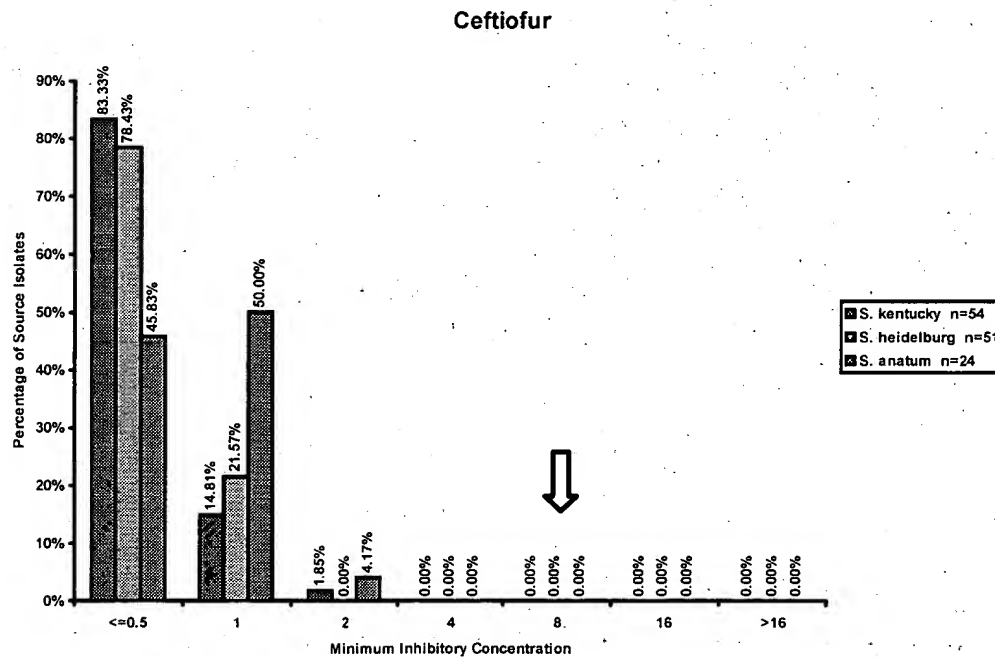


Breakpoint = 32

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

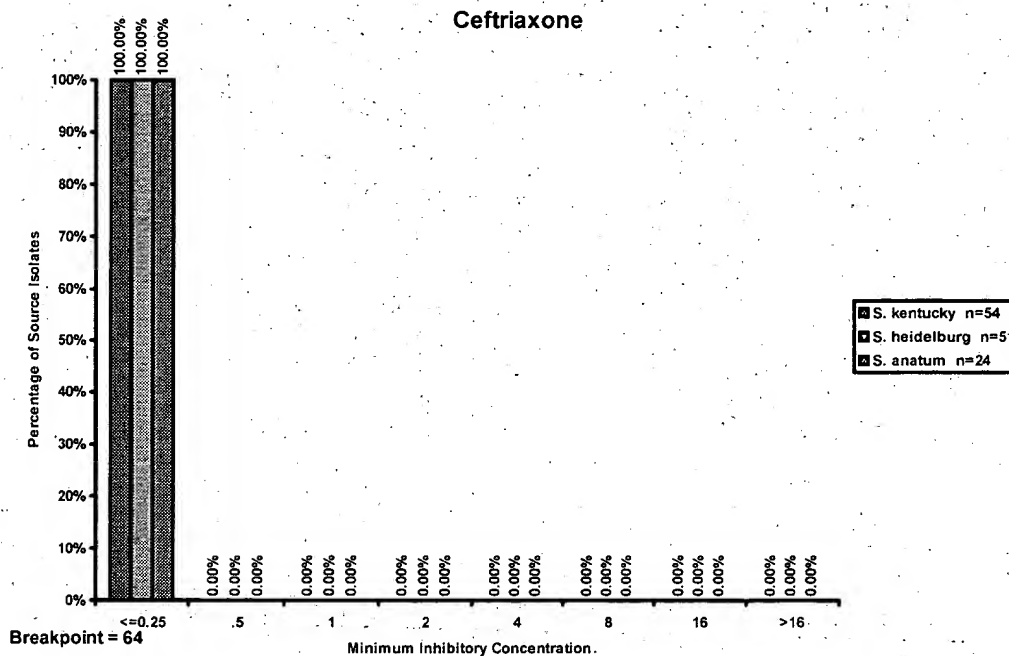


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

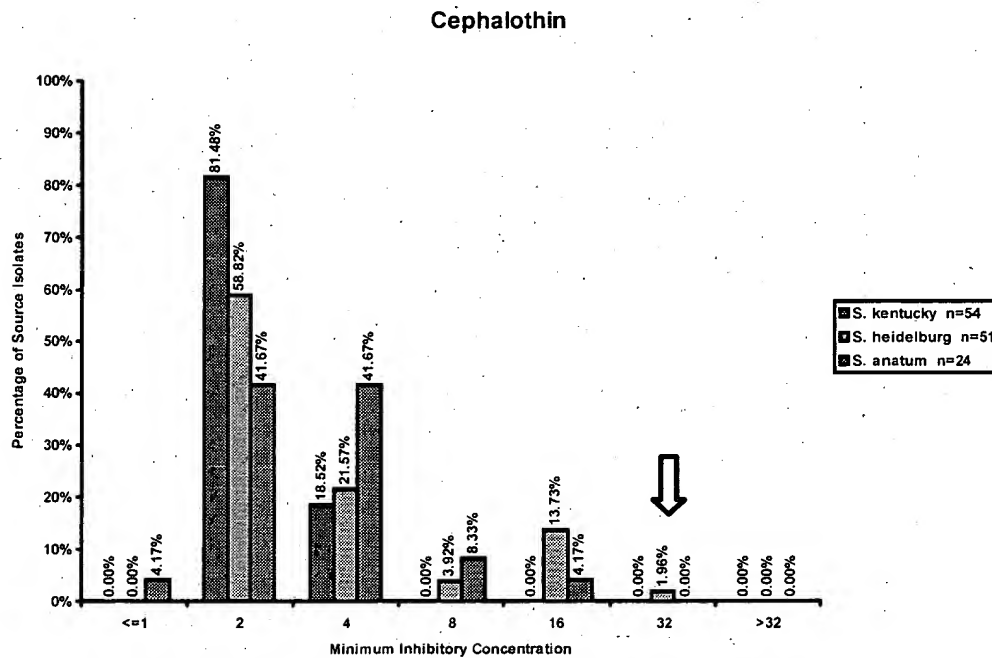


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

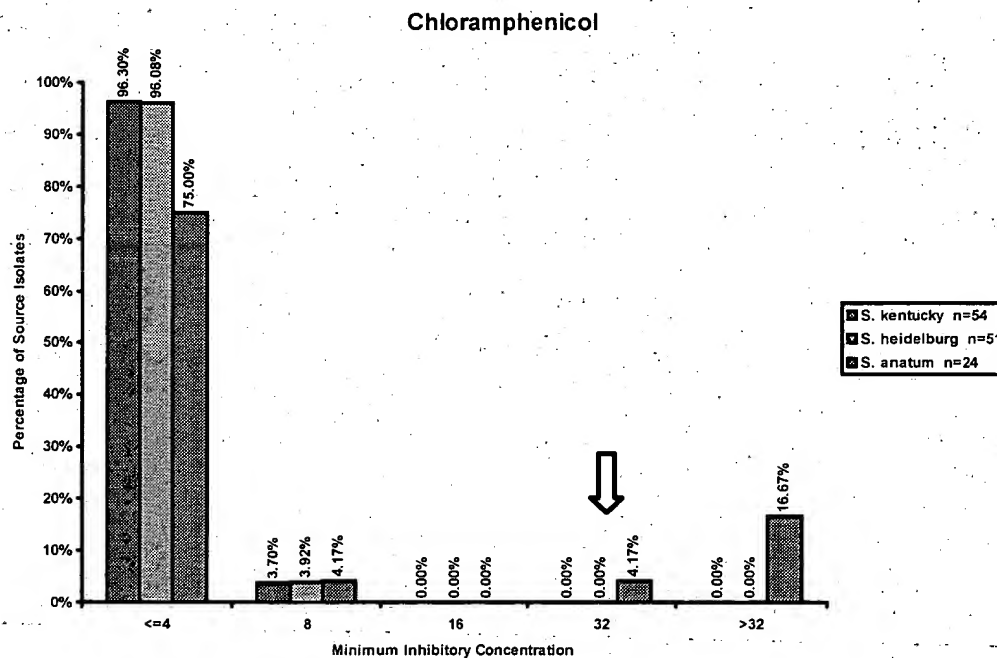


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

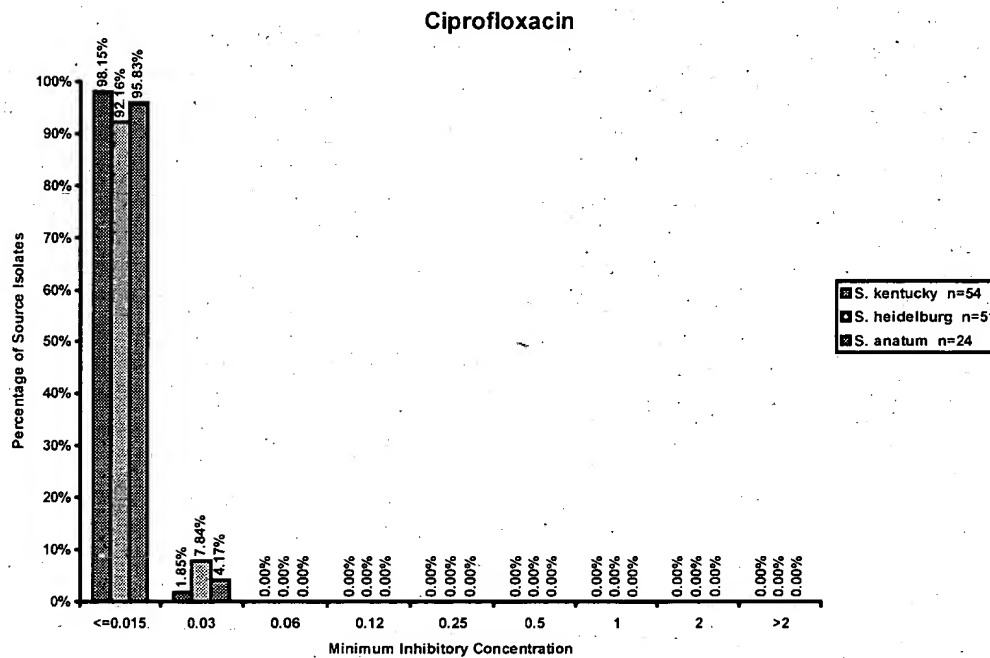
**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**



NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

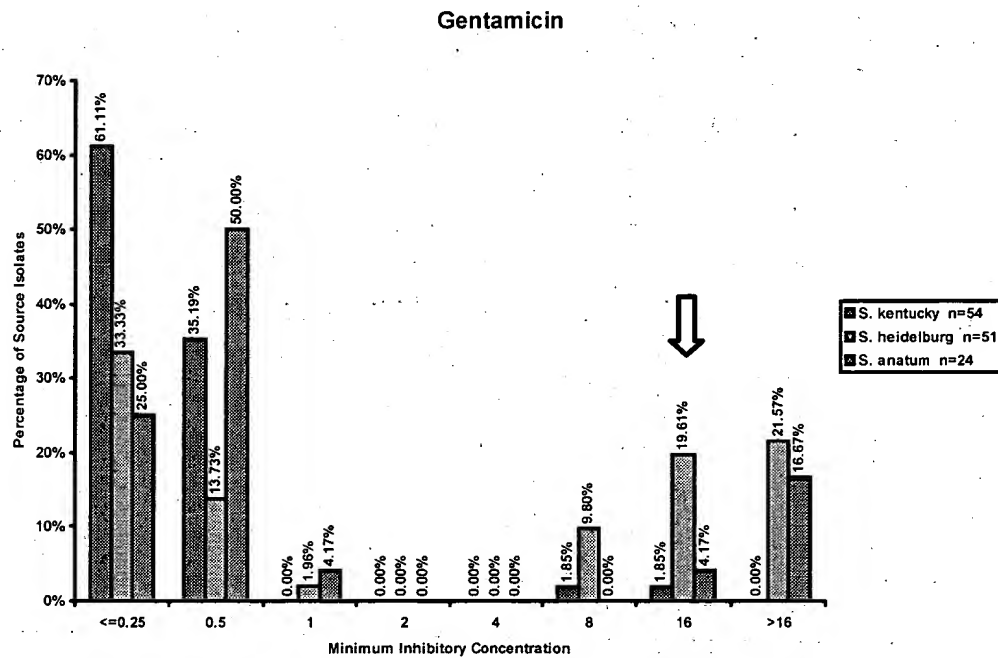


Breakpoint = 4

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

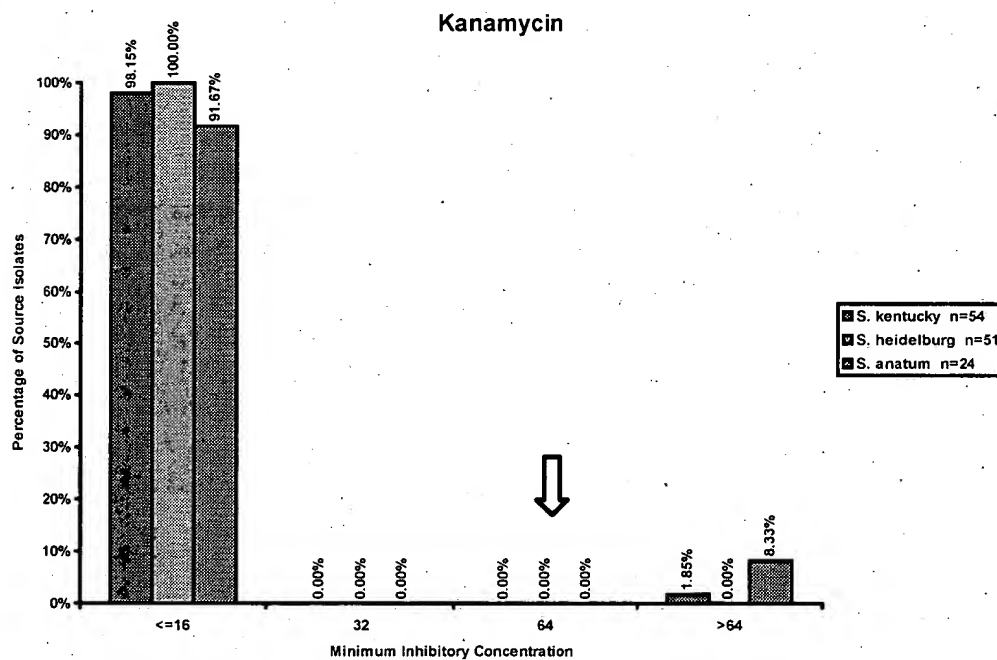


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

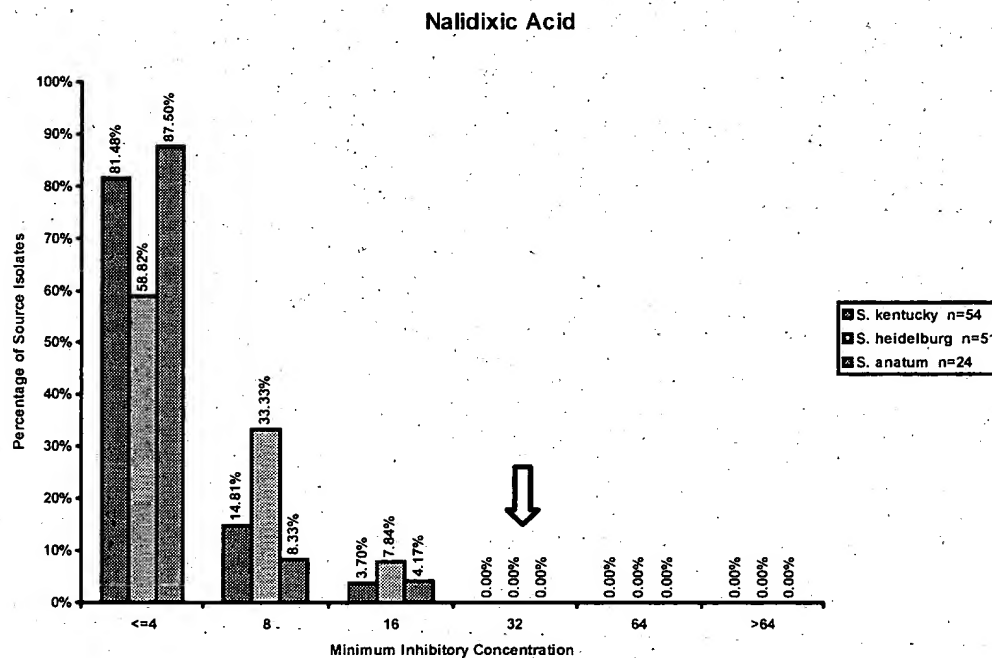


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

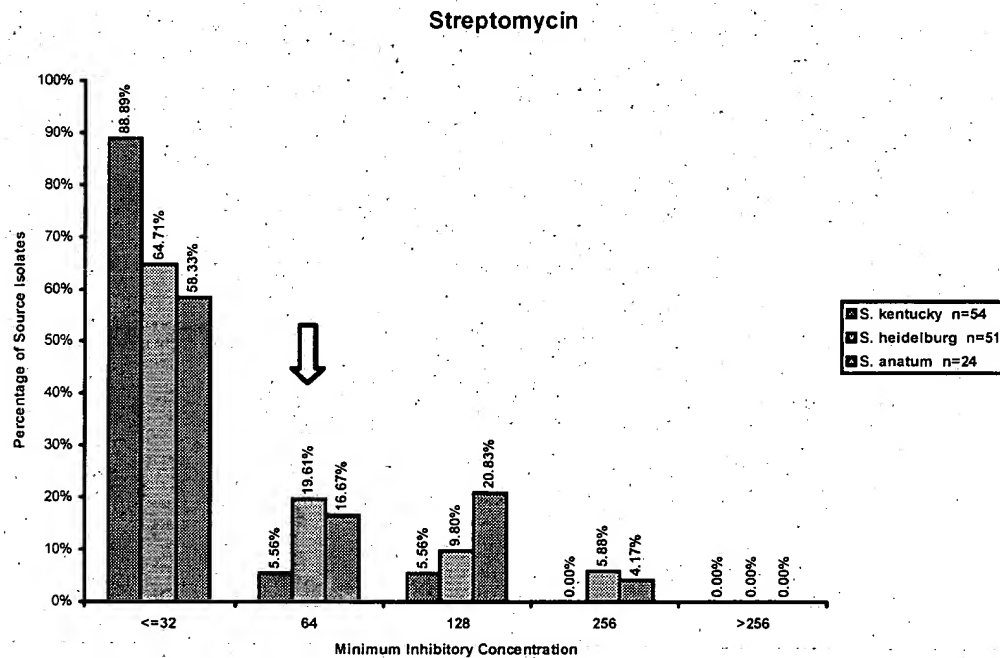


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

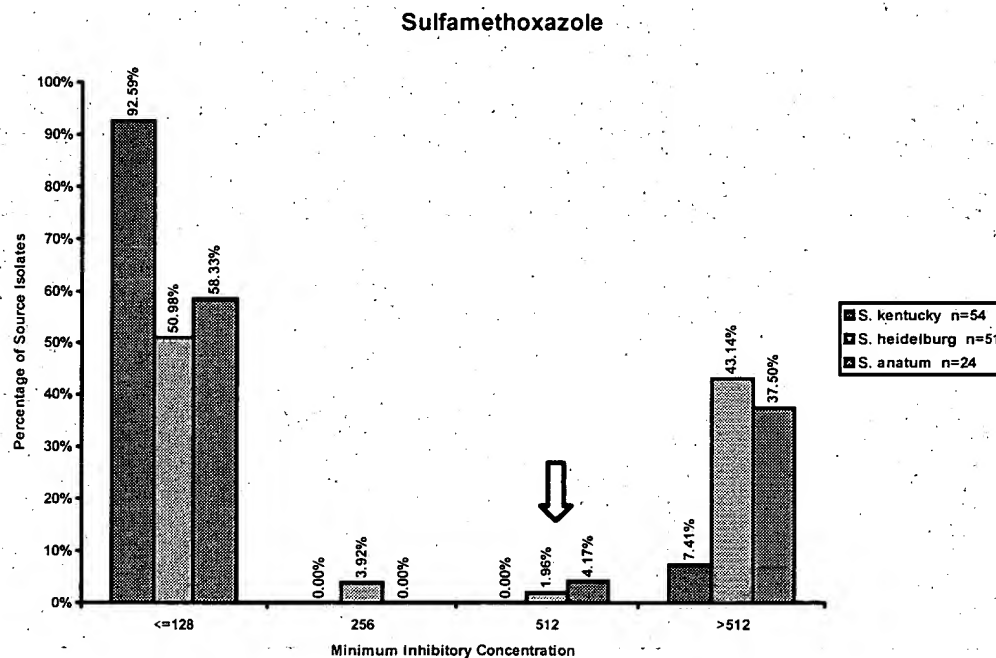


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

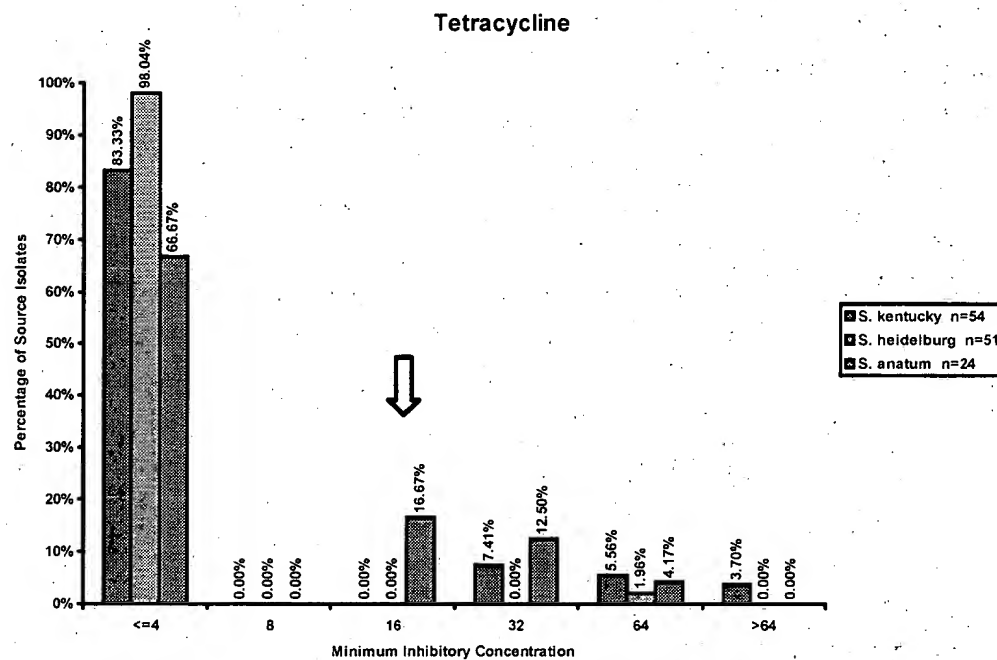


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

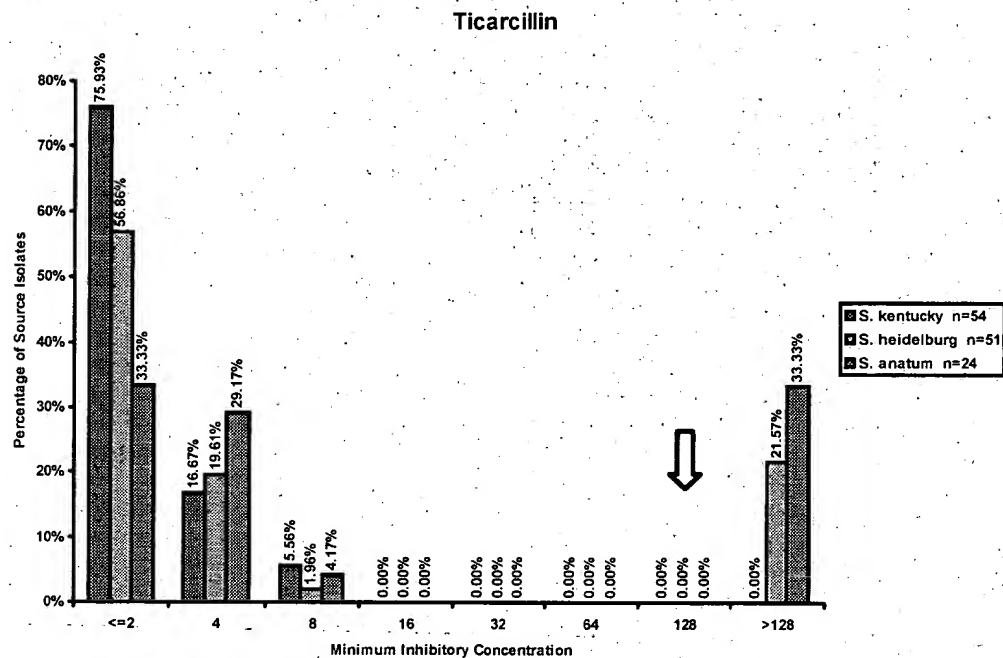


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

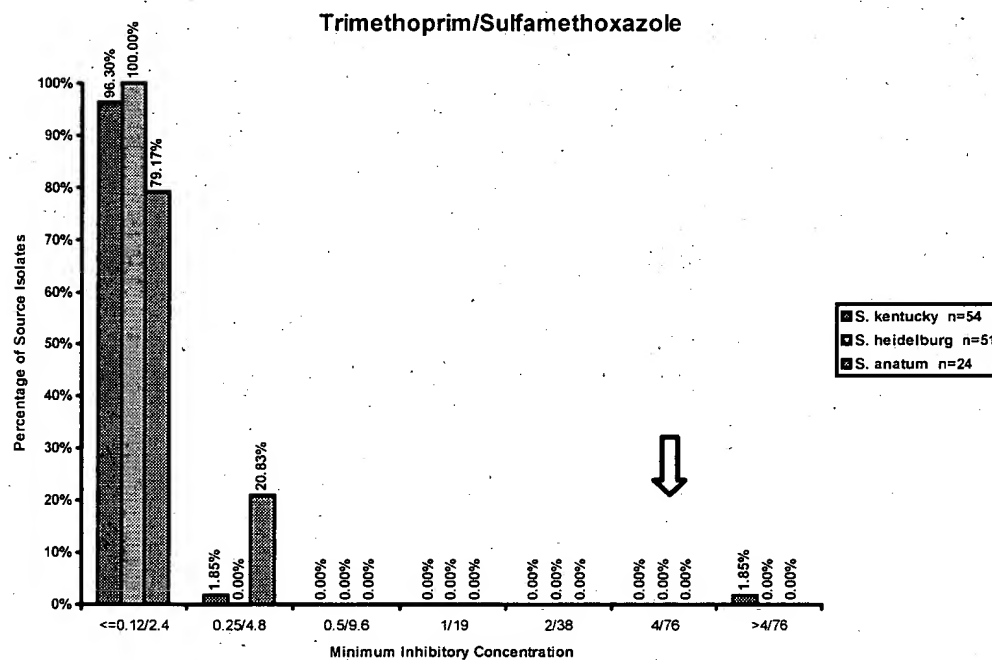


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 25. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Chicken (Slaughter)**

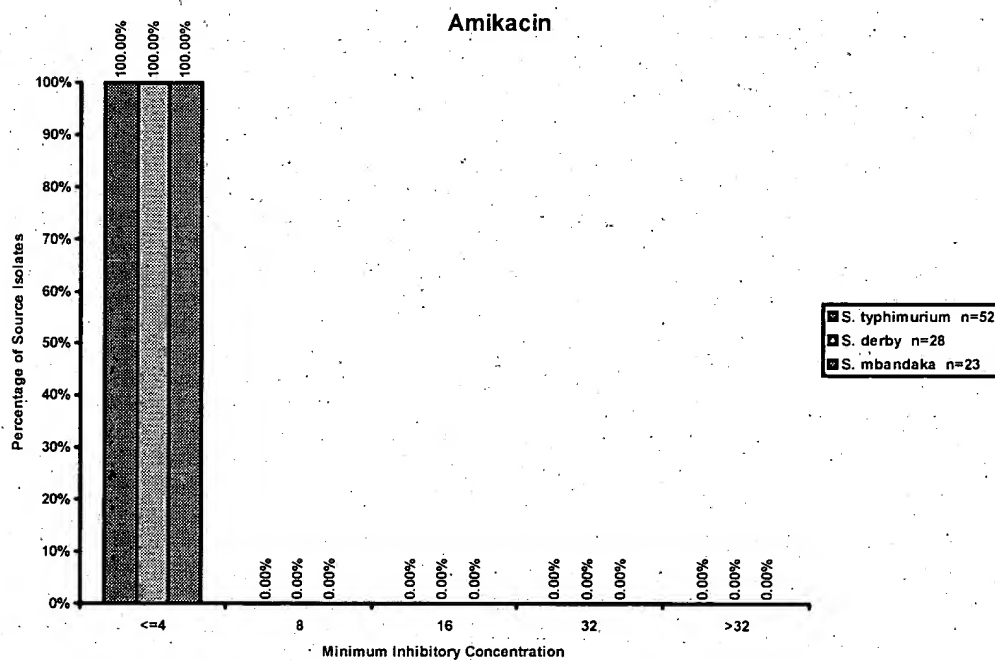


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**

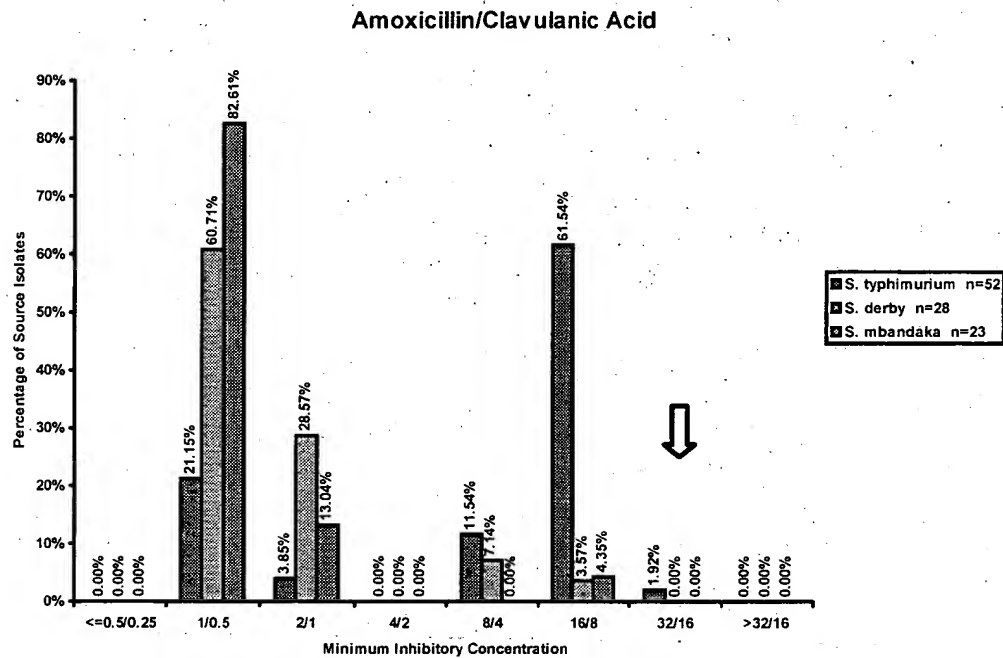


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**

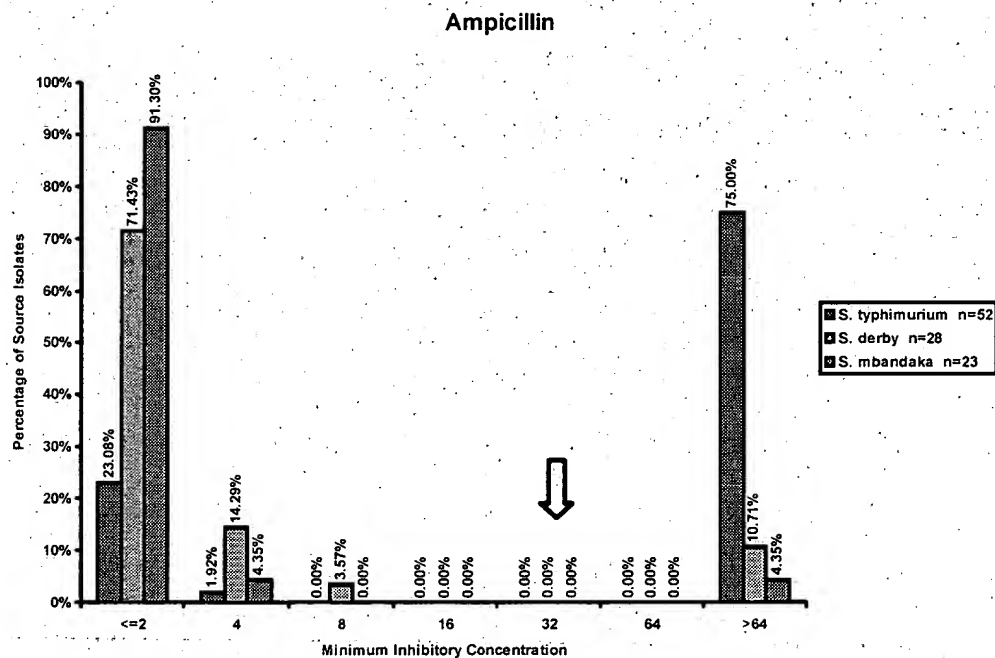


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**

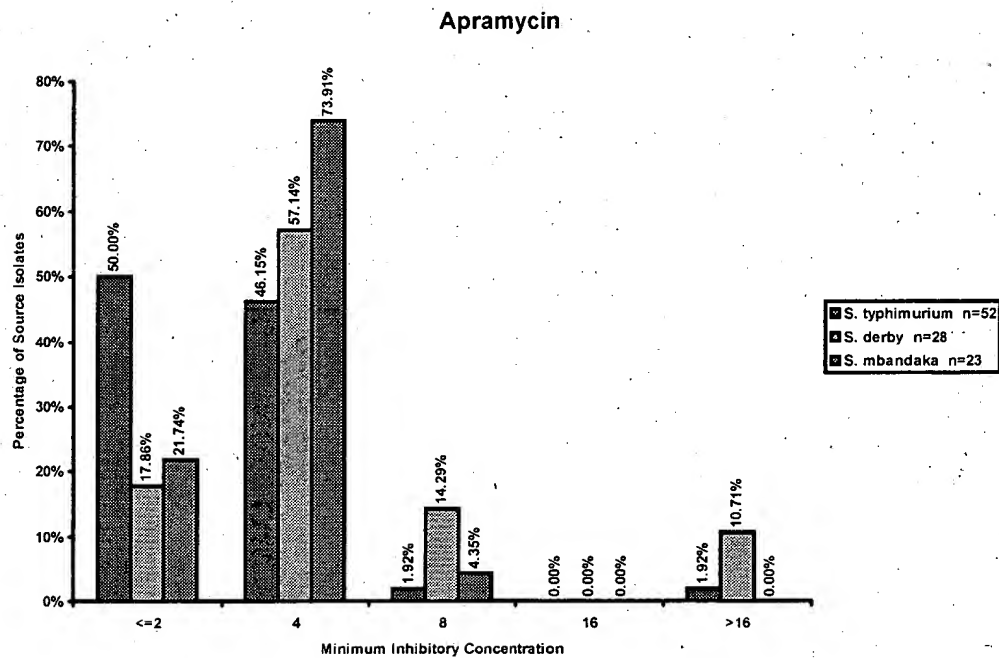


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**

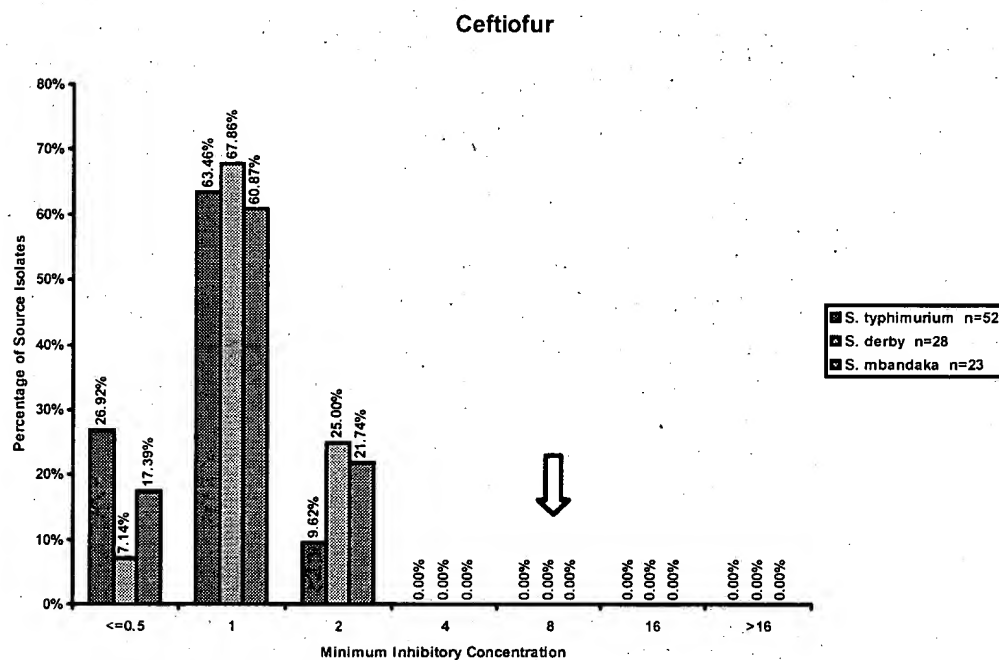


Breakpoint = 32

NARMS - EB 1997

Veterinary Isolates

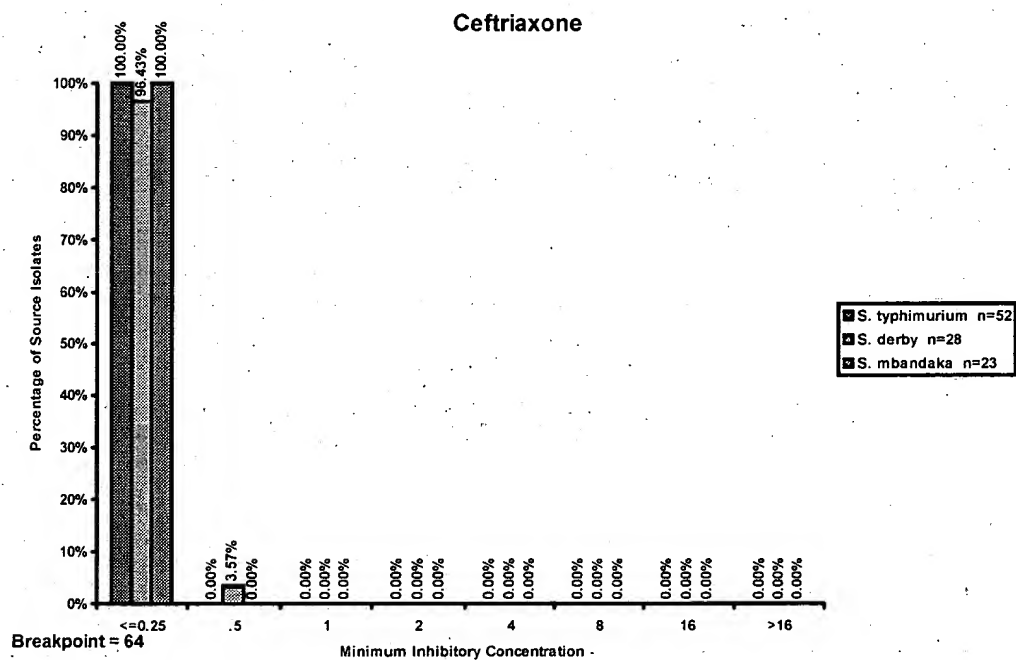
**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**



↓ Breakpoint

NARMS - EB 1997 **Veterinary Isolates**

**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**

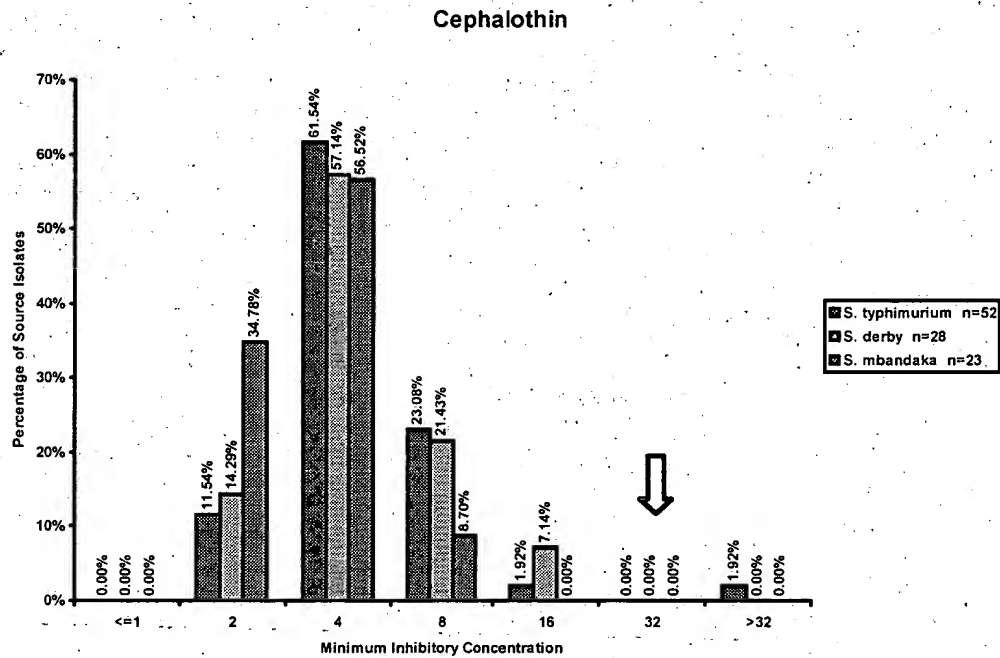


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**

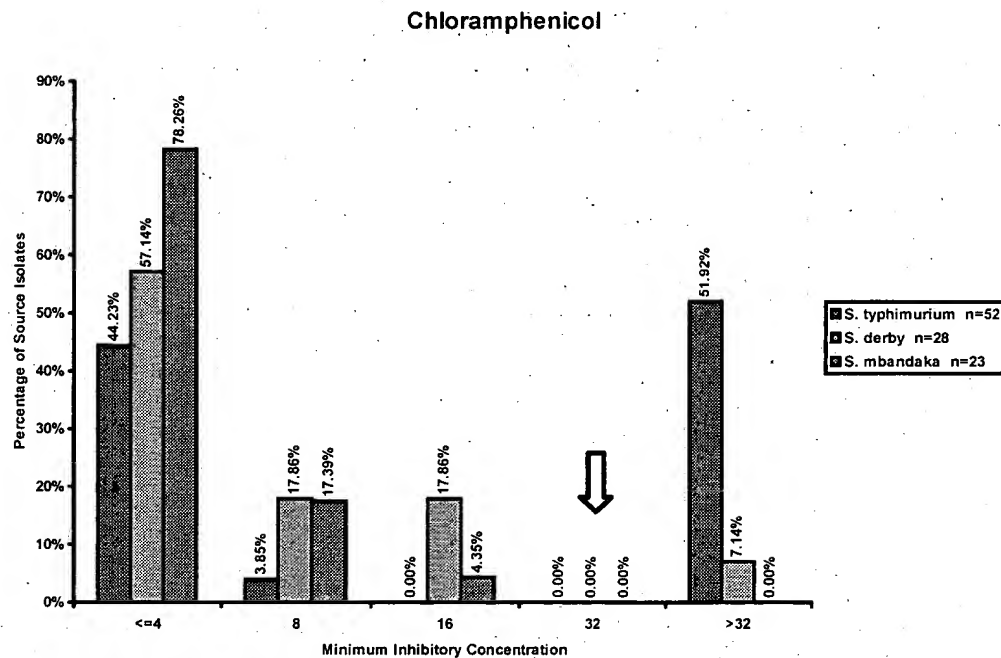


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**

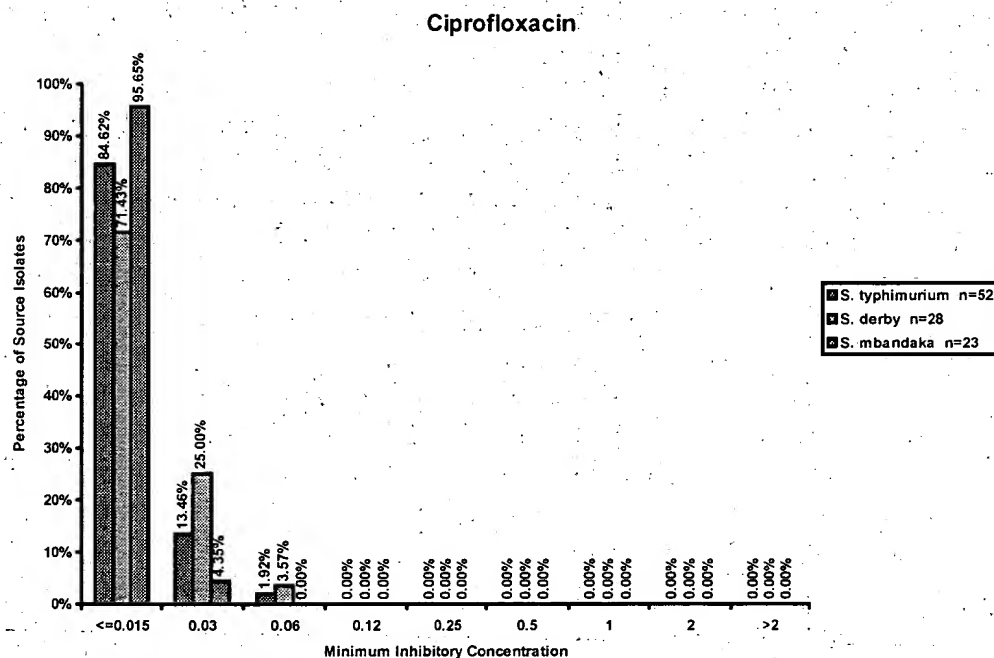


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**

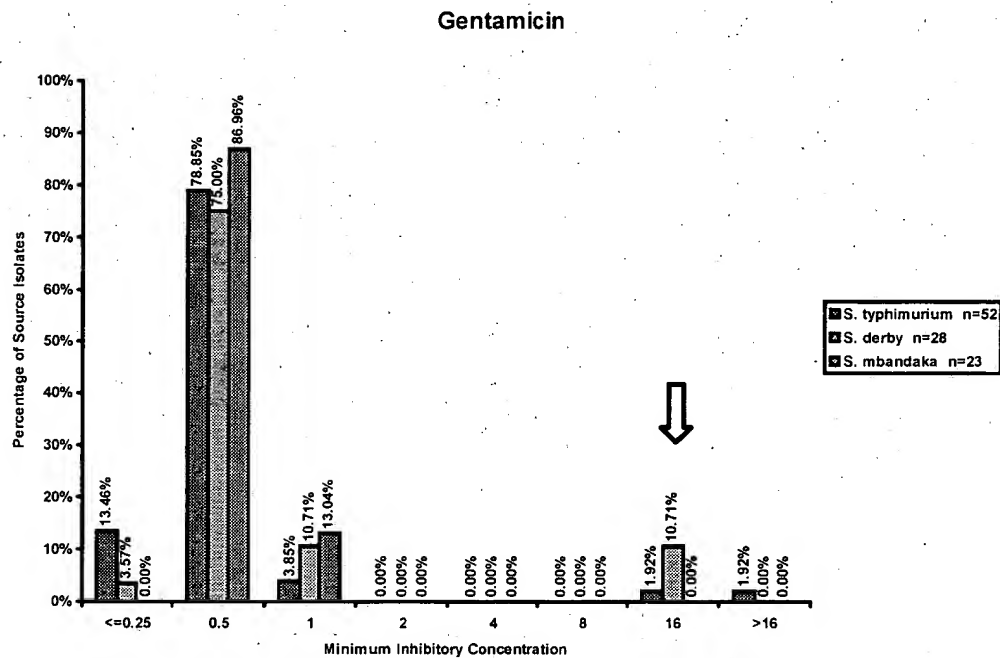


Breakpoint = 4

NARMS - EB 1997

Veterinary Isolates

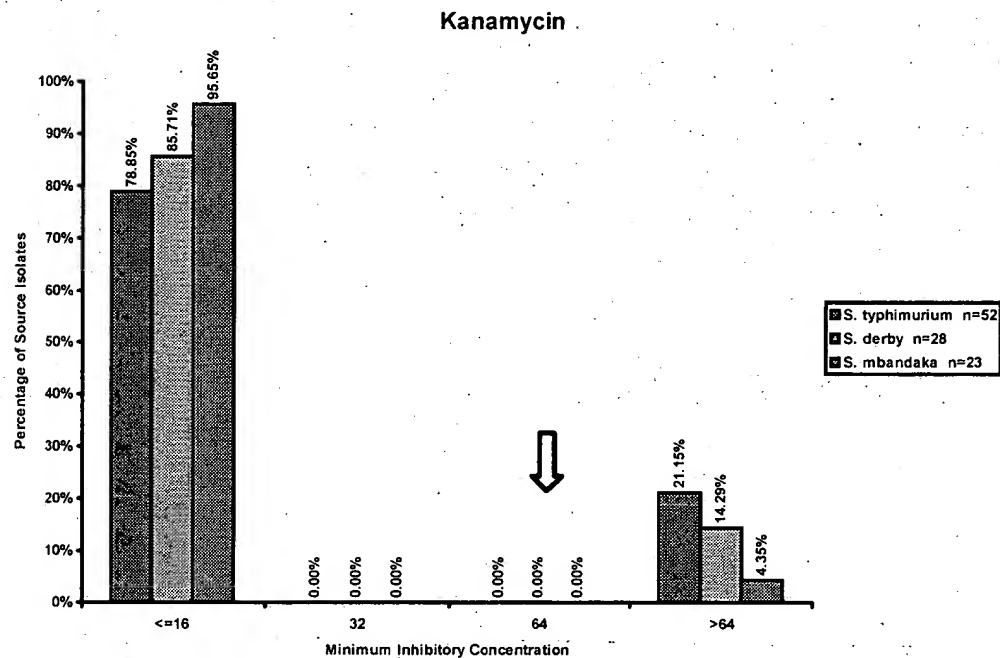
**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**



NARMS - EB 1997

Veterinary Isolates

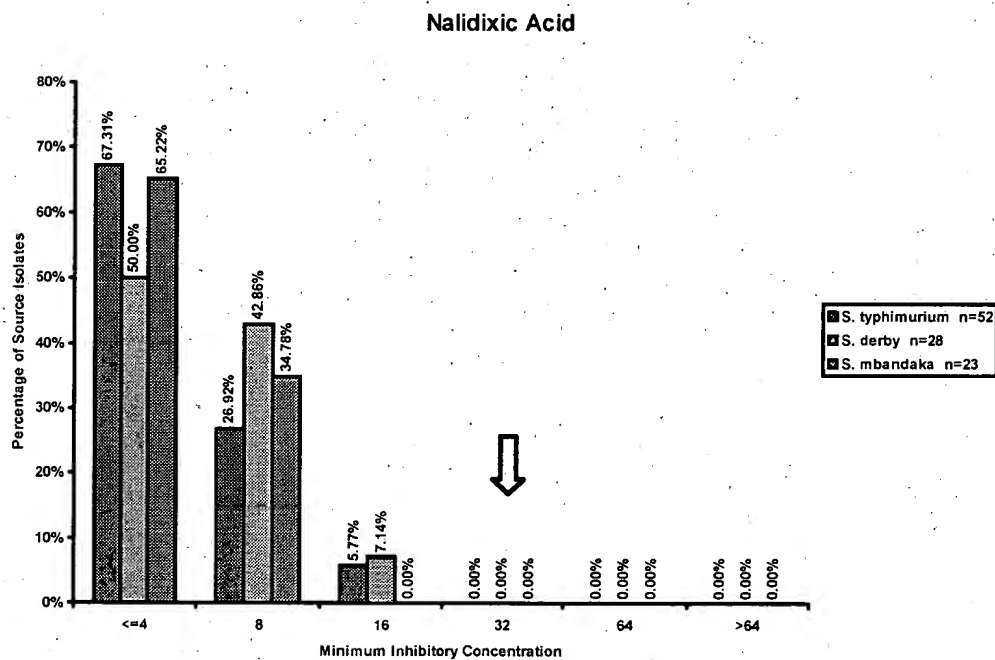
**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**



NARMS - EB 1997

Veterinary Isolates

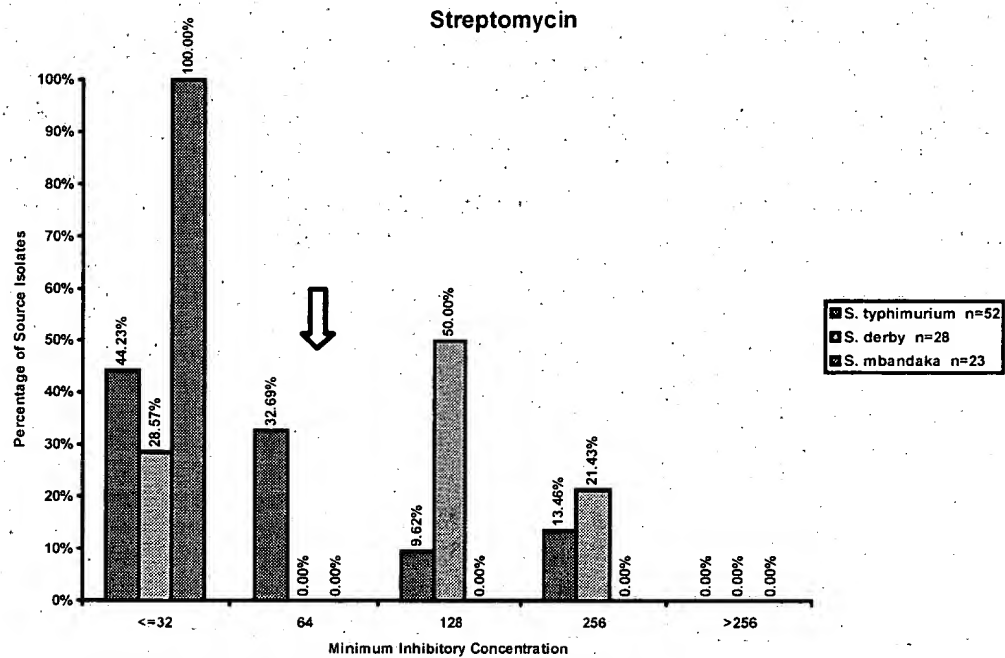
**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**



NARMS - EB 1997

Veterinary Isolates

**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**

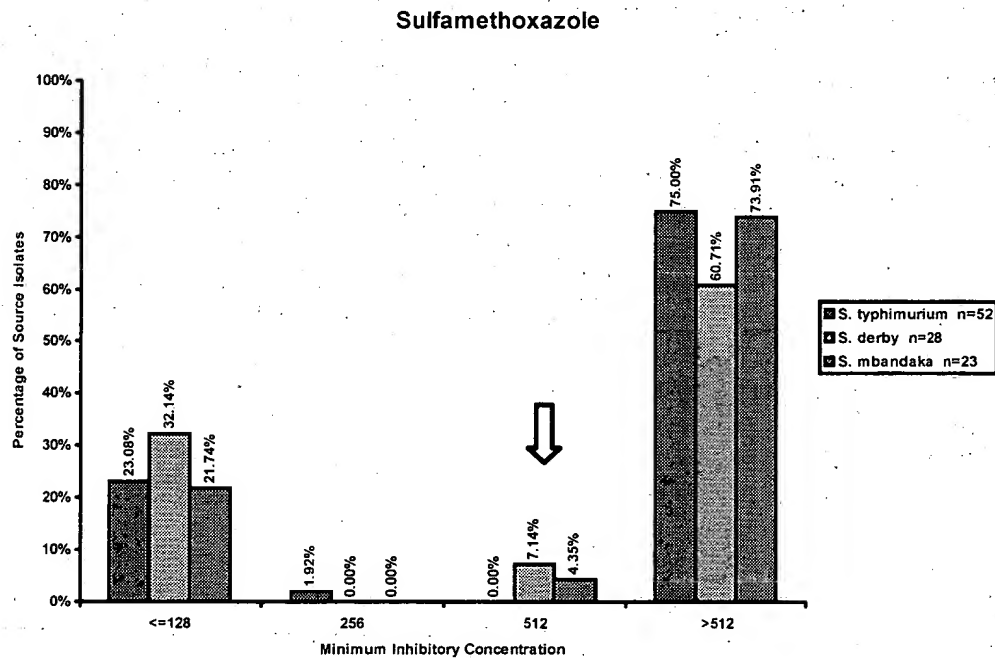


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**

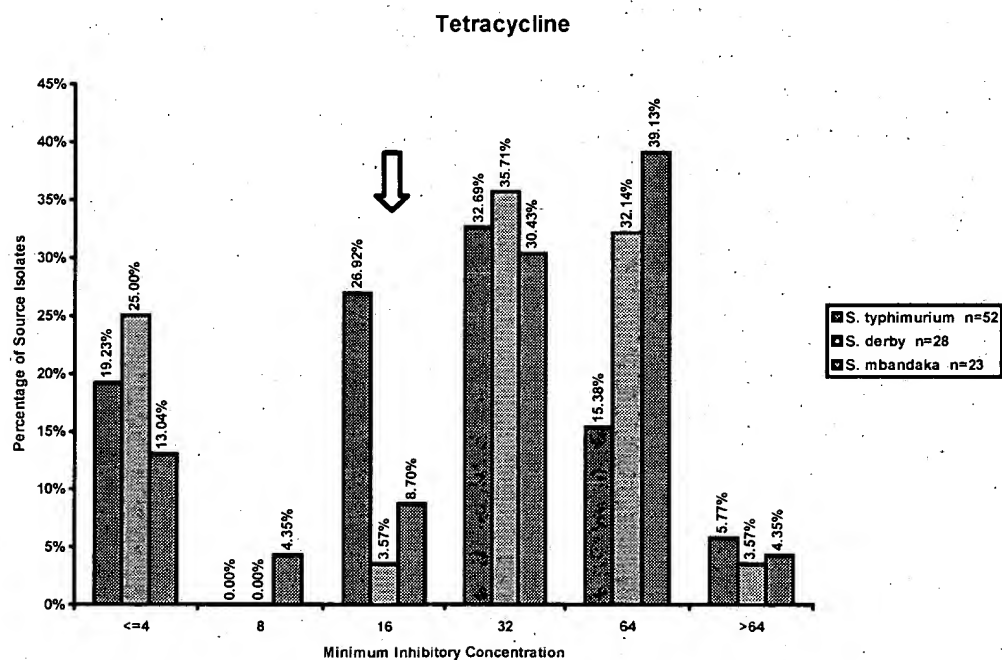


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**

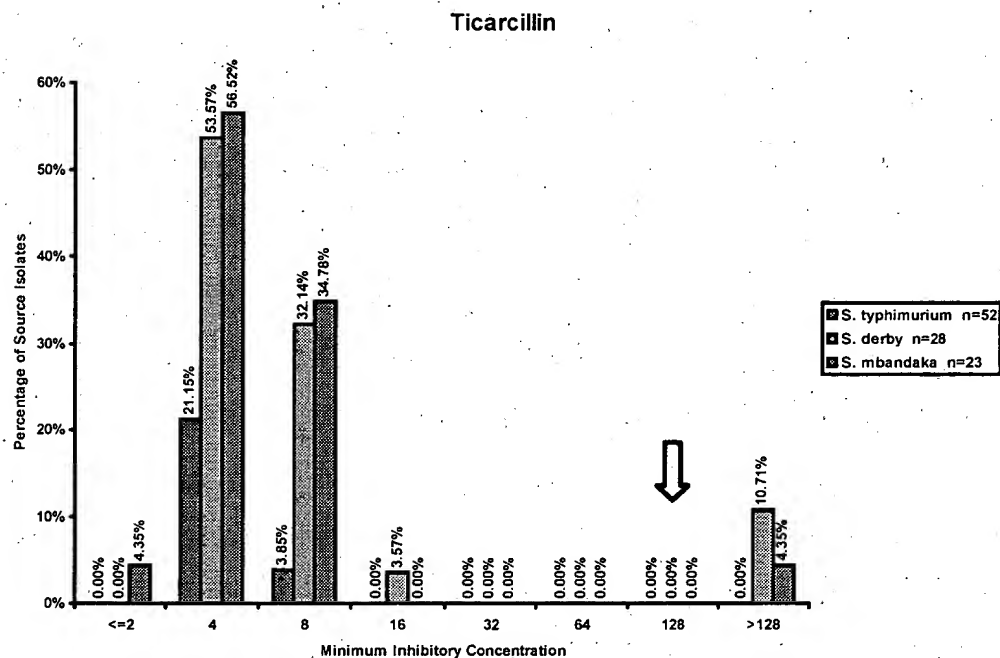


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**

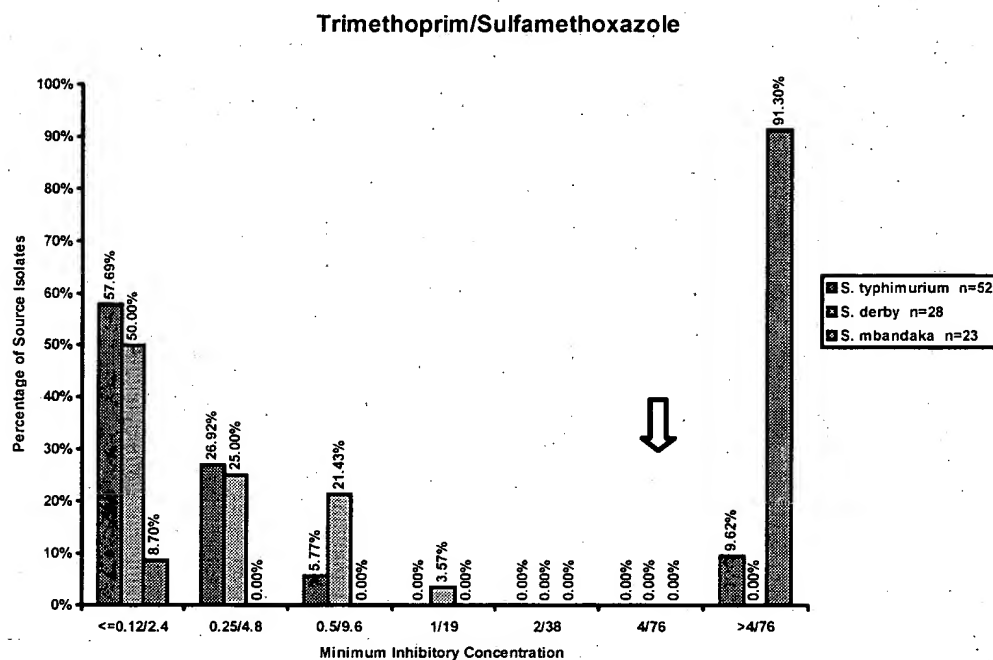


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 26. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Diagnostic)**

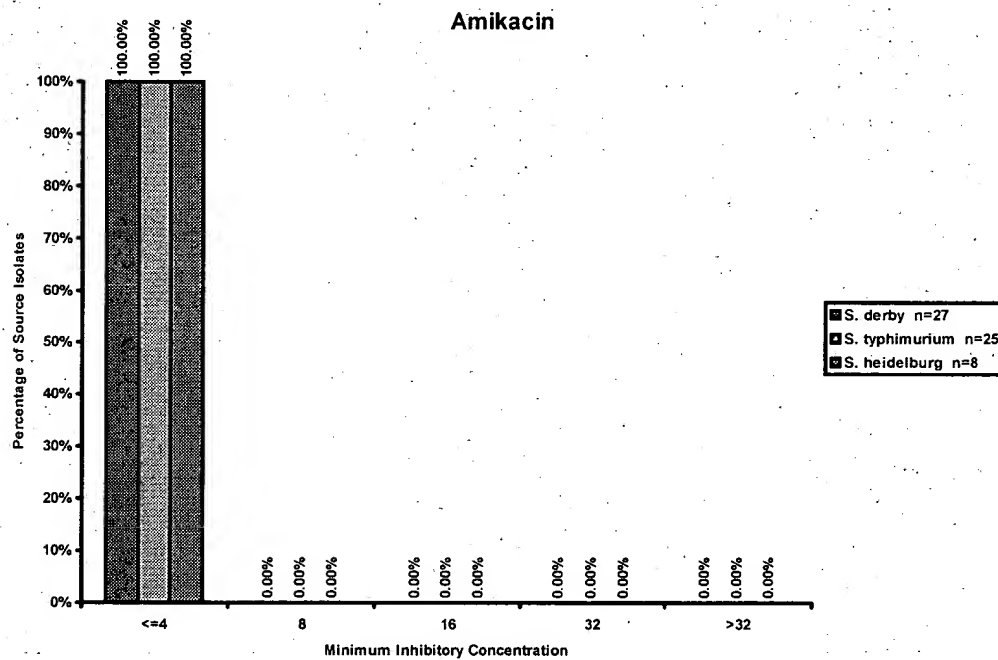


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

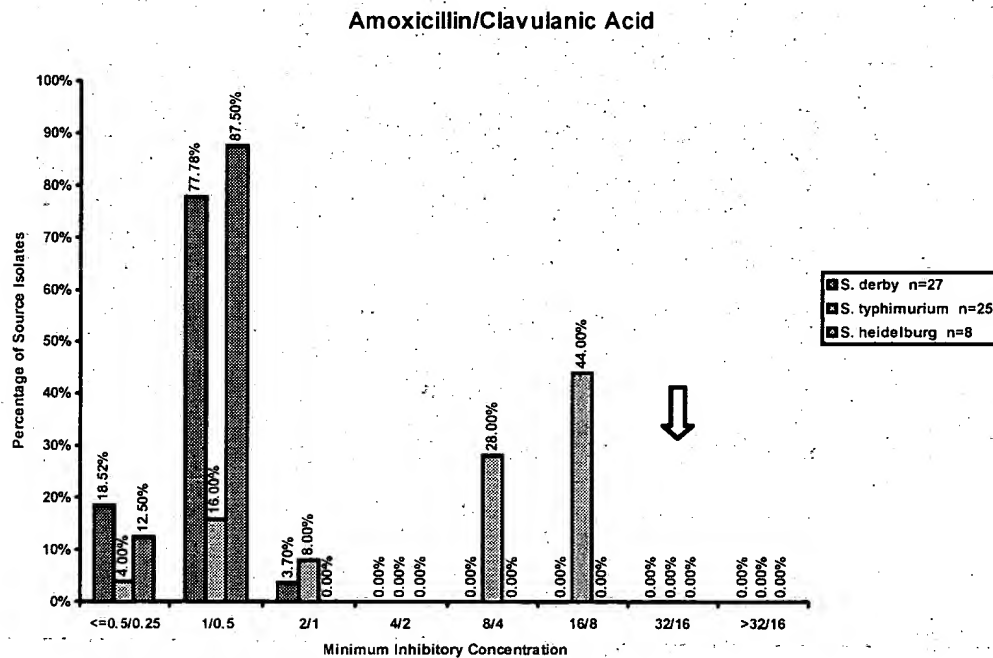


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

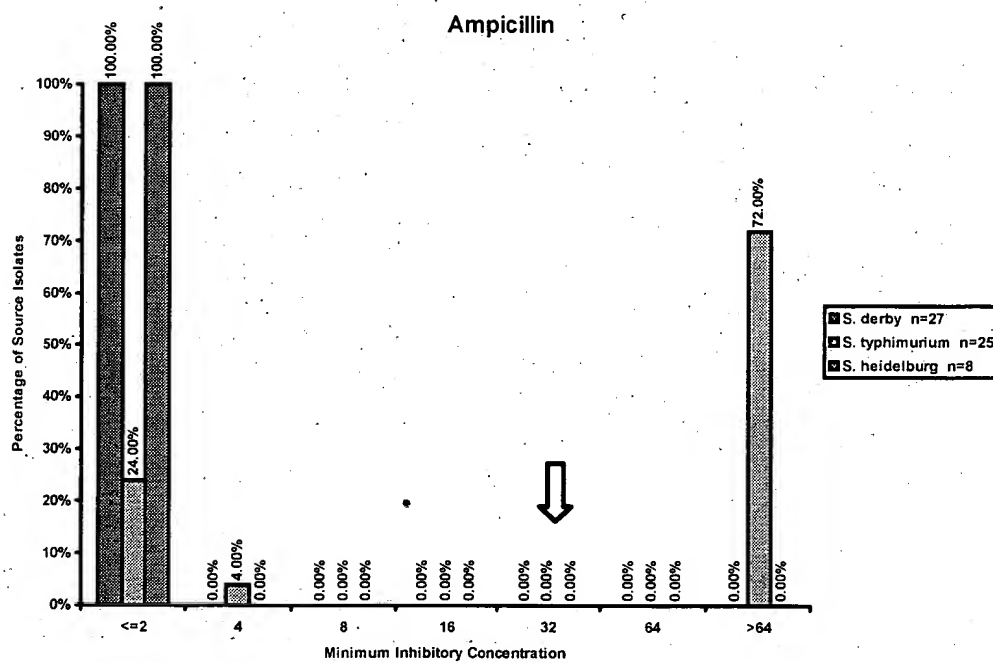


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

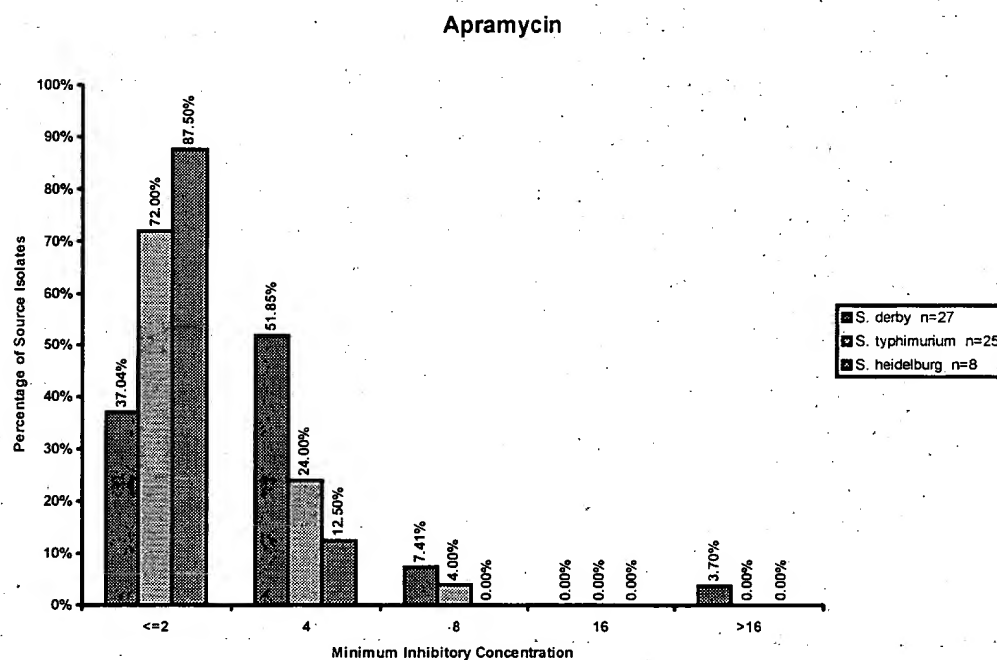


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

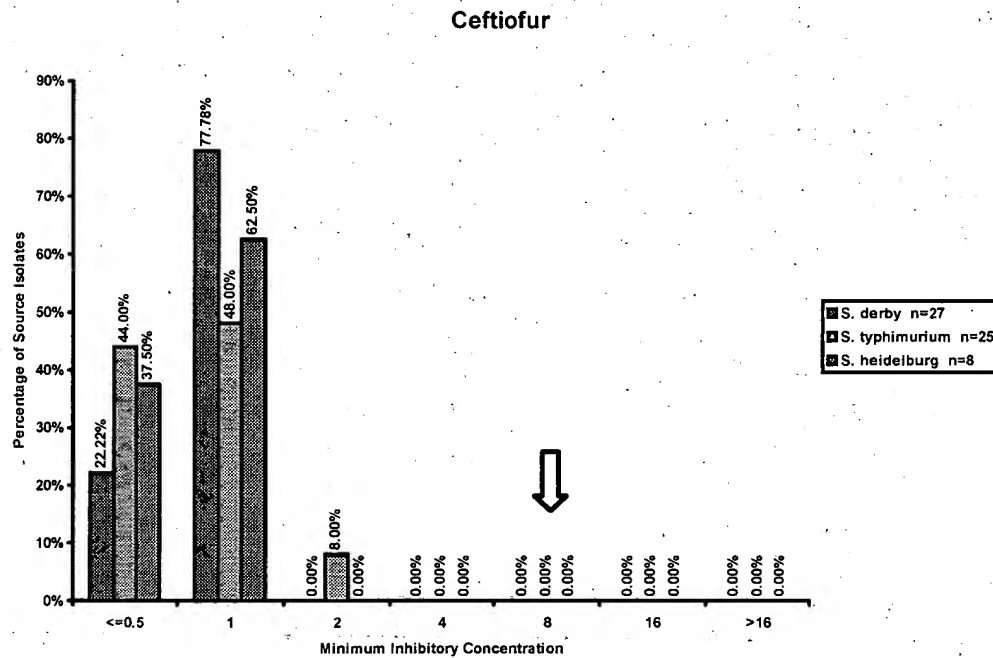


Breakpoint = 32

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

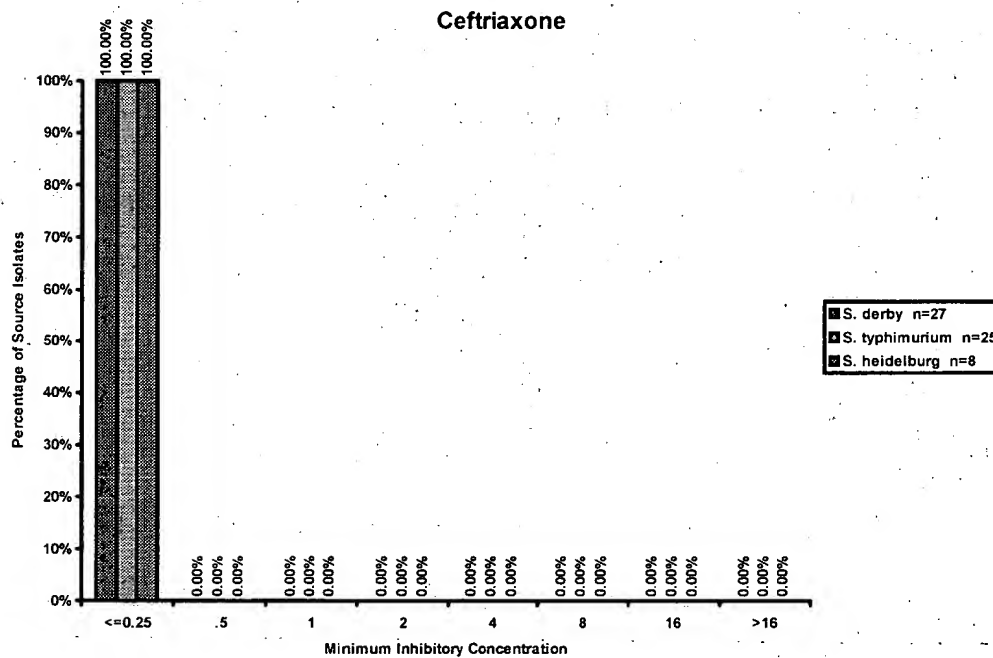


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

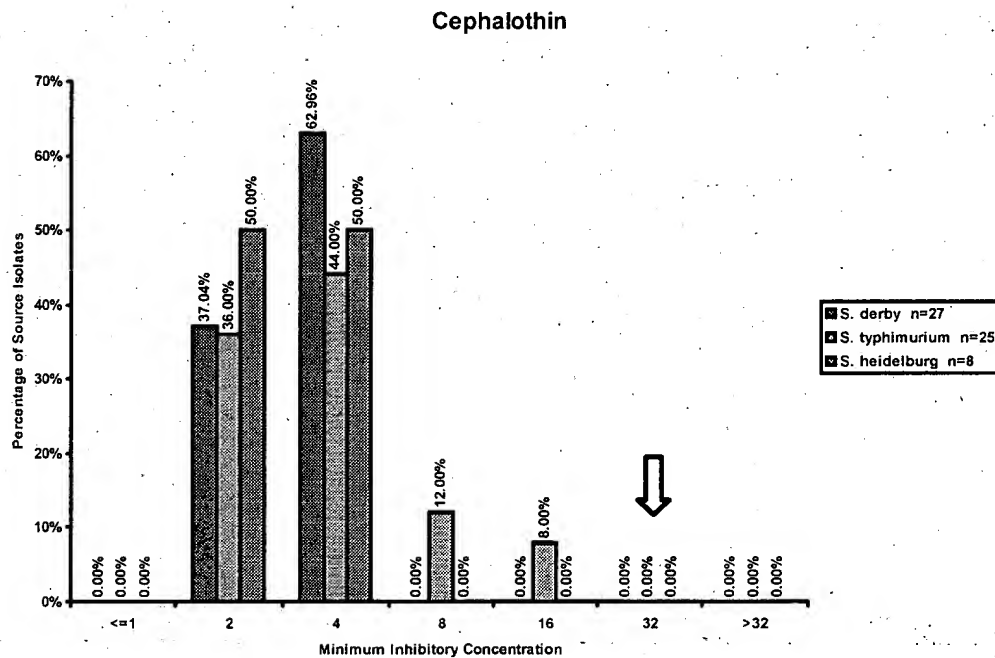


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

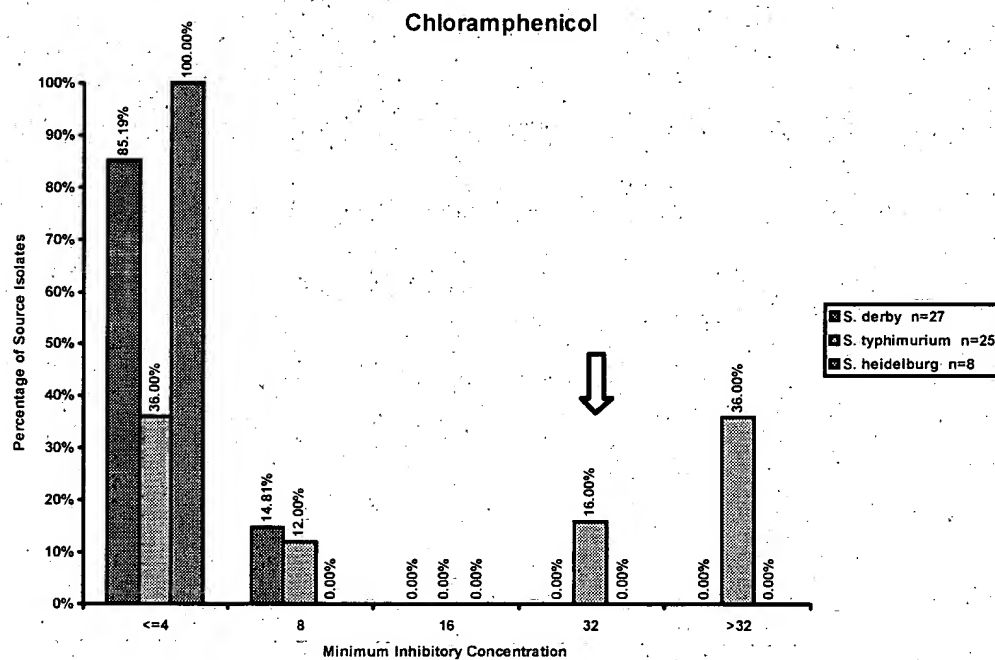


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

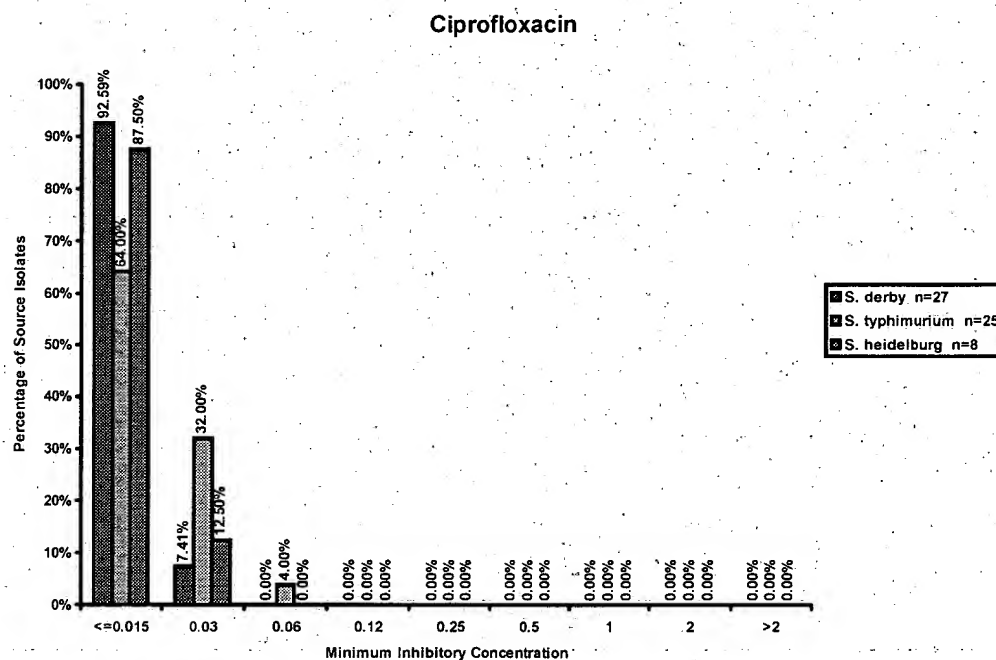


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

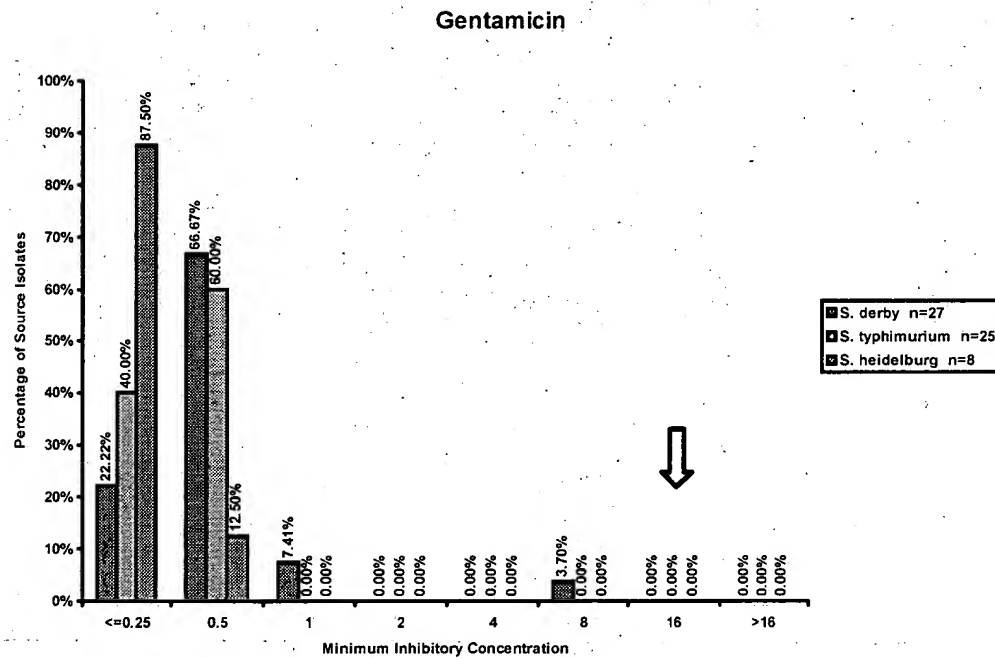


Breakpoint = 4

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

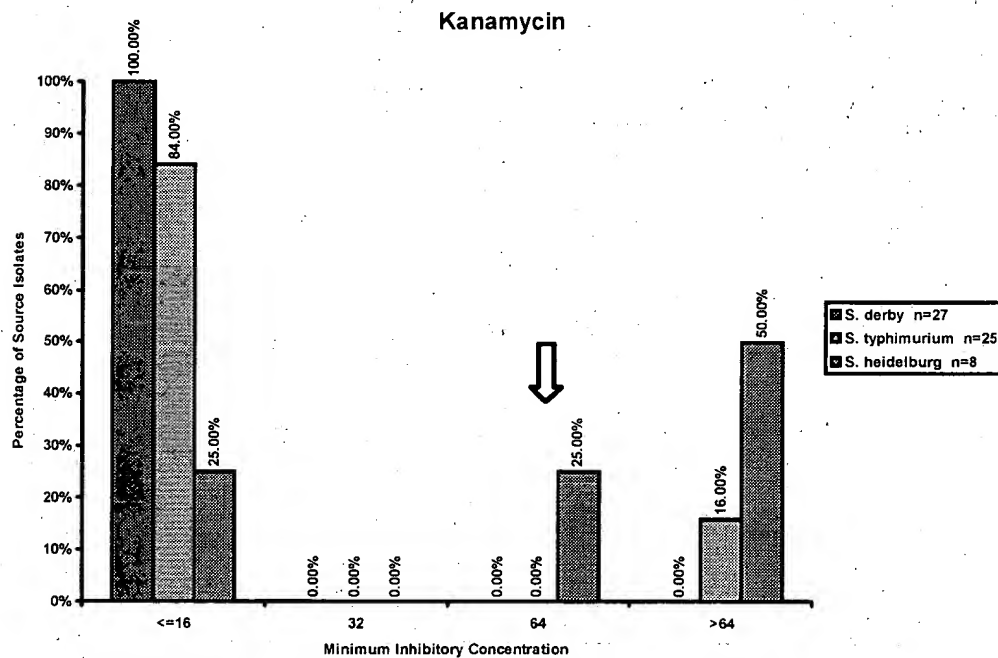


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

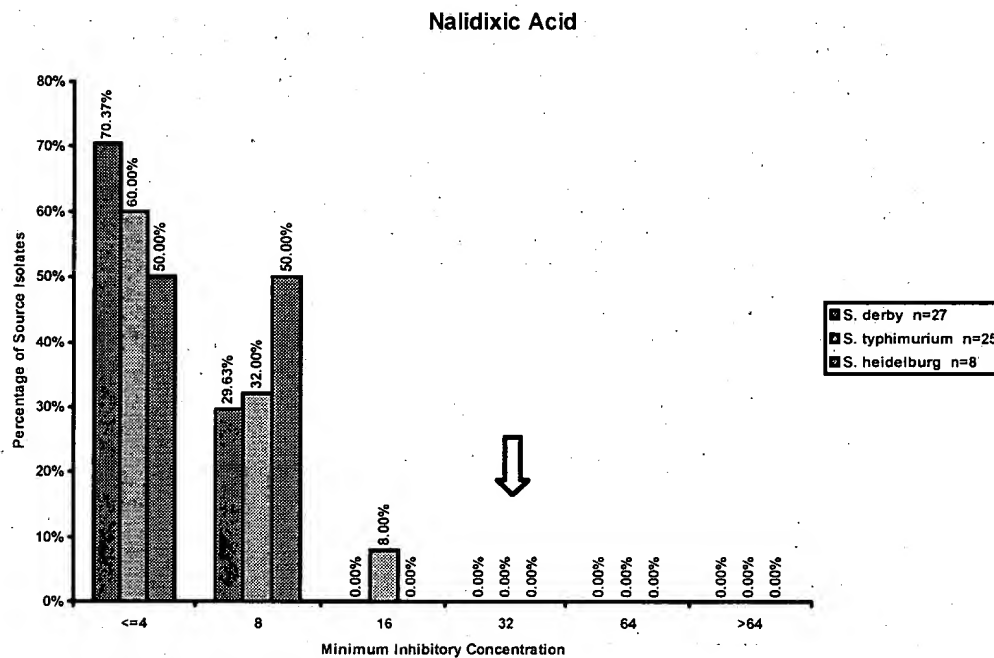


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

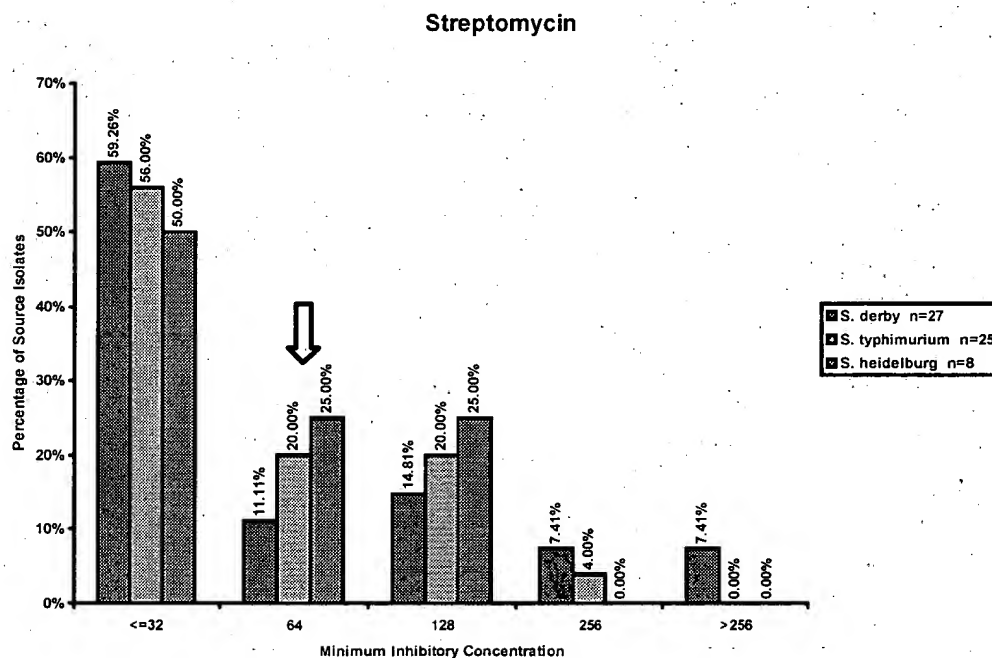


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

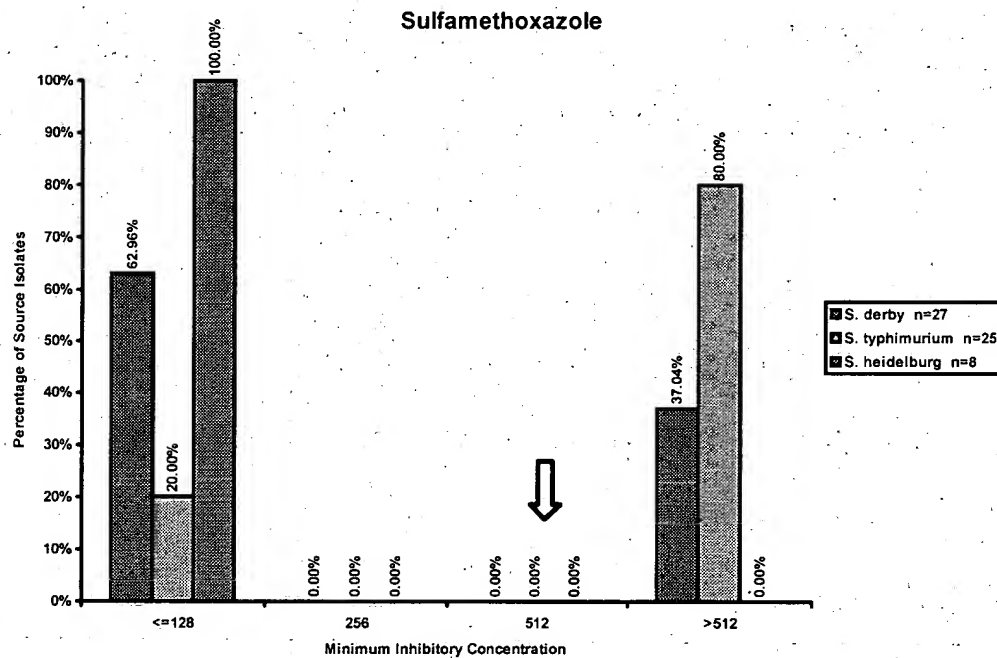


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

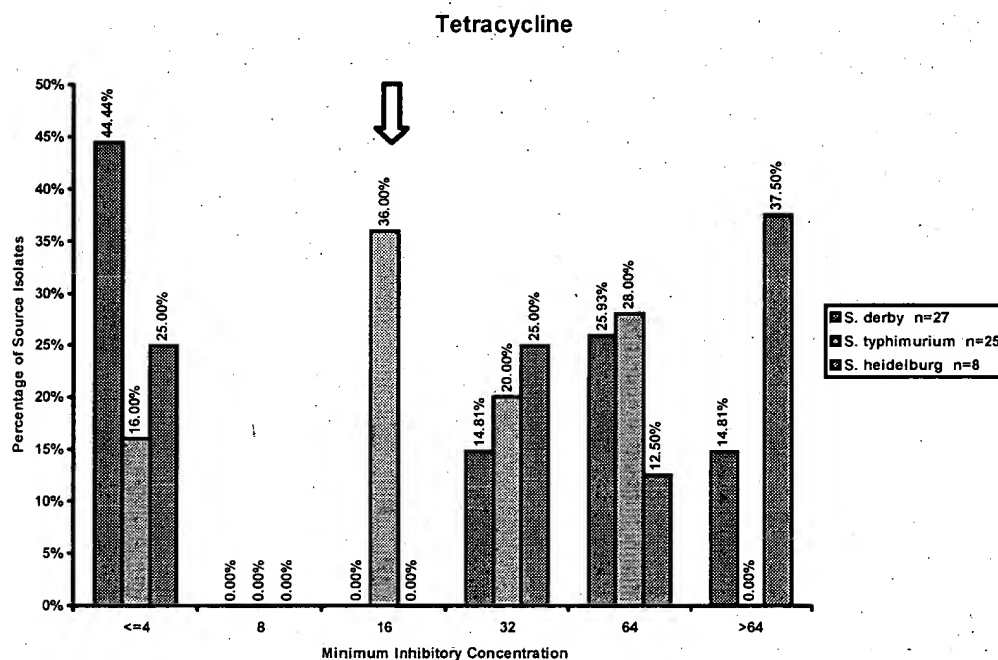


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

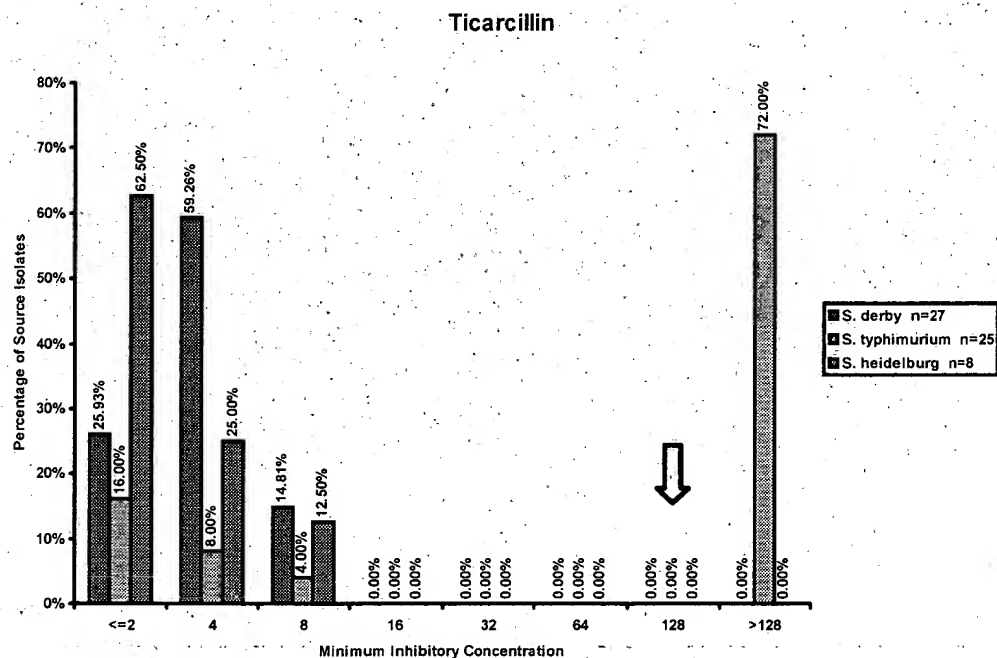


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

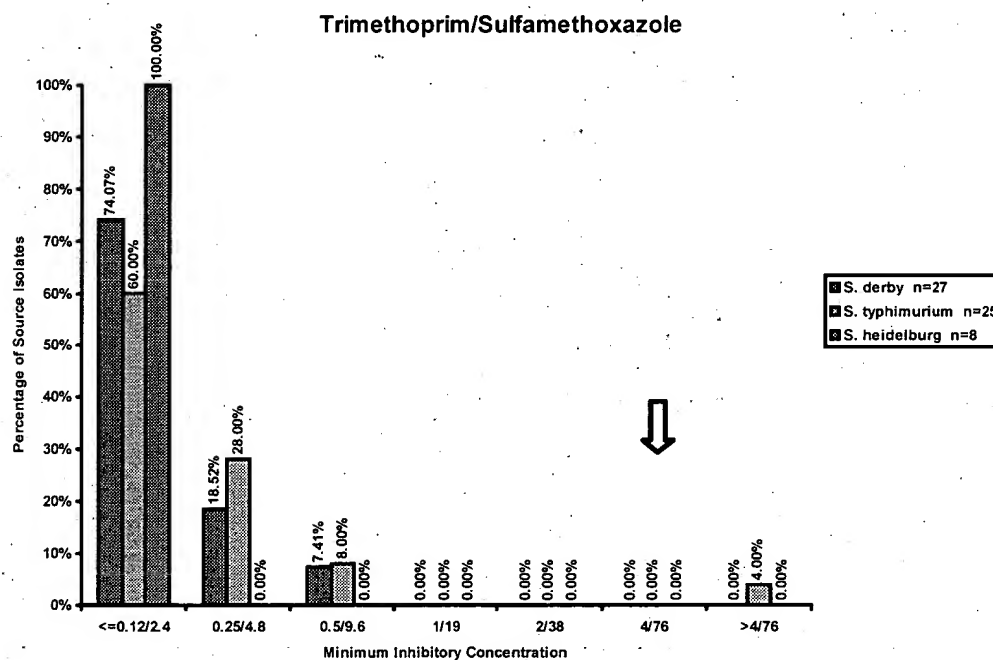


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 27. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Slaughter)**

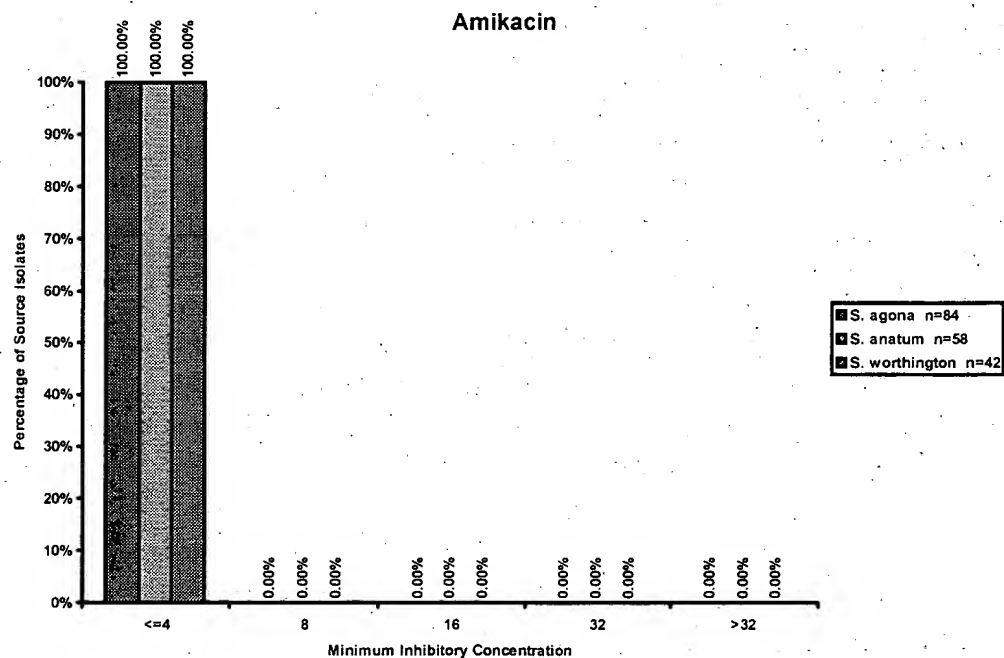


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

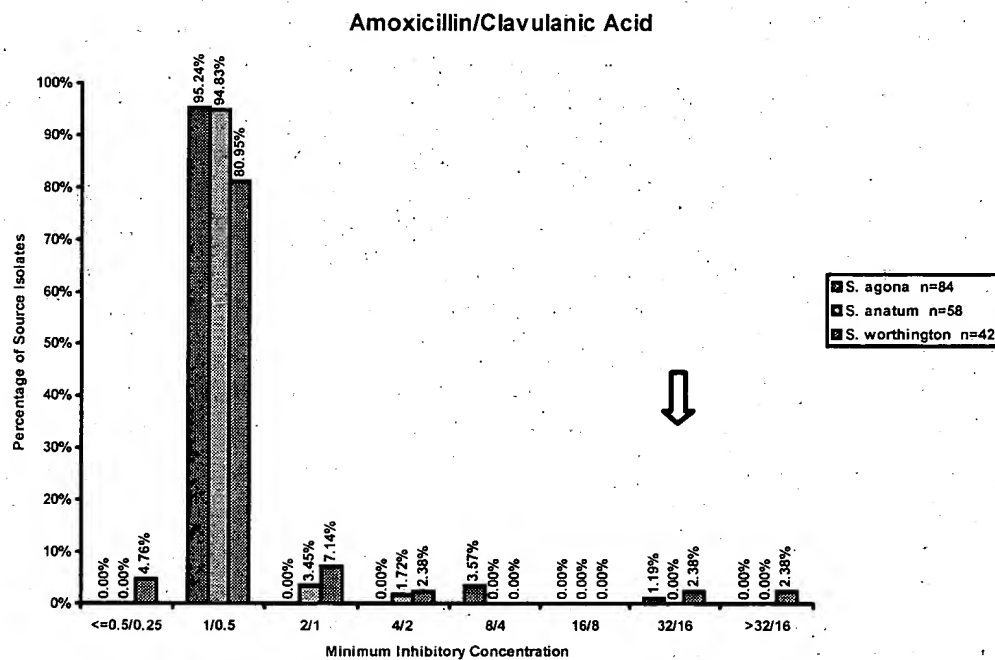


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

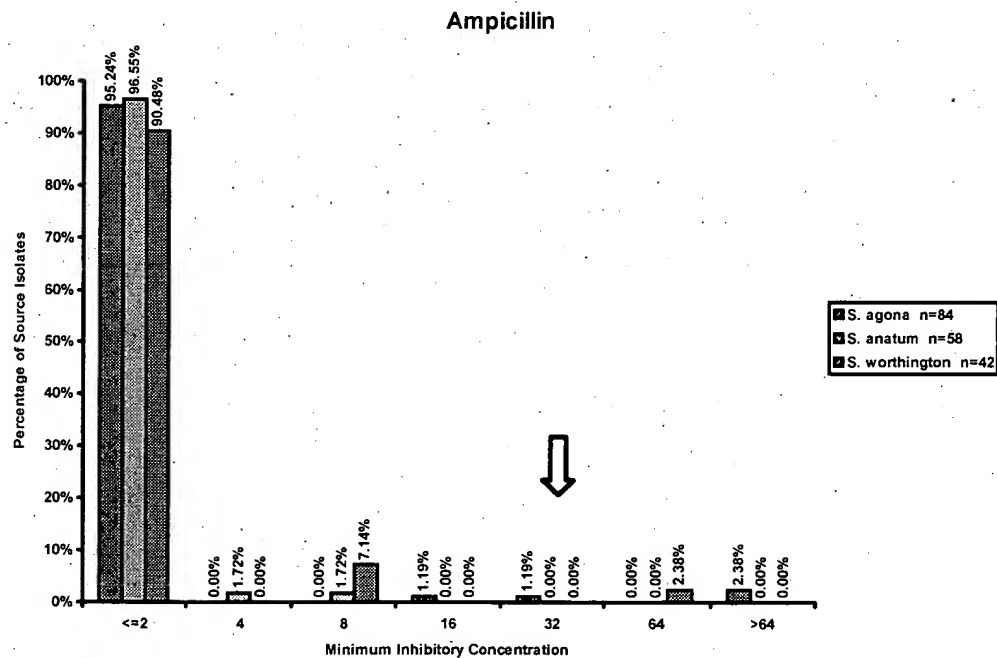


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

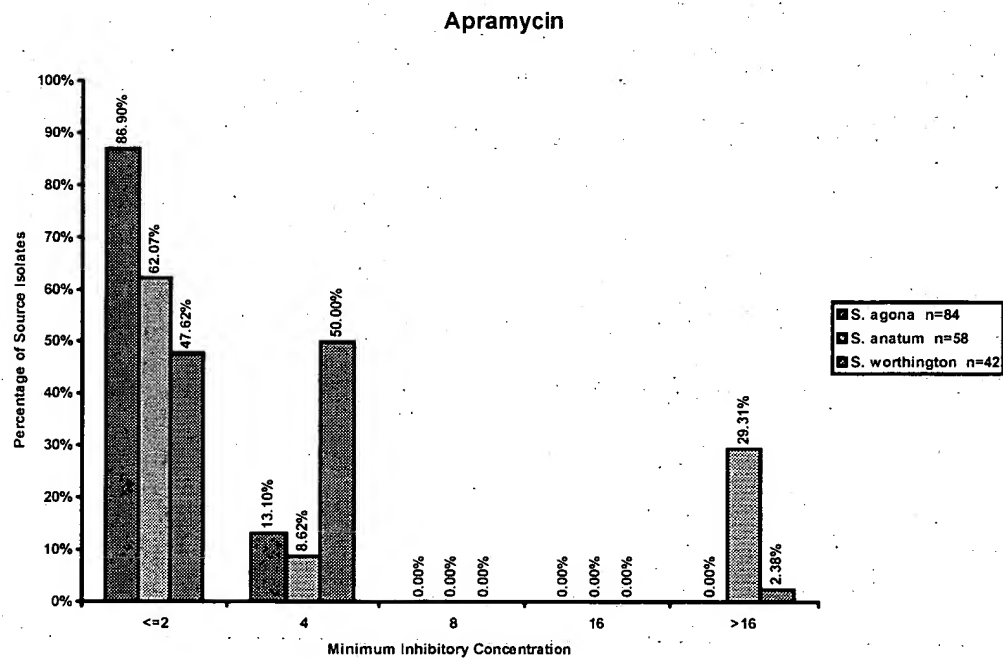


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

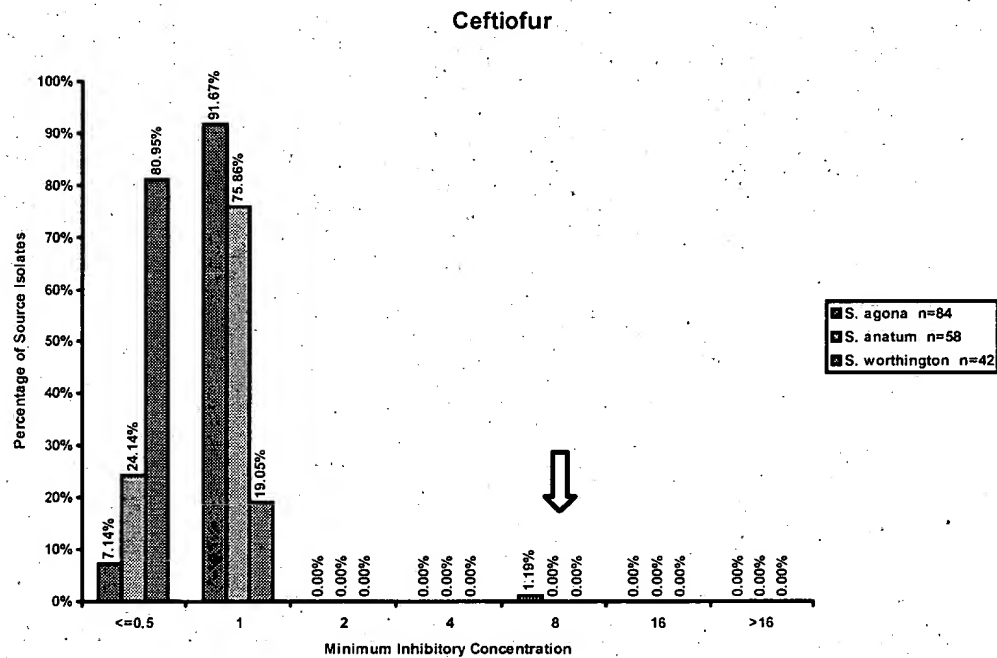


Breakpoint = 32

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

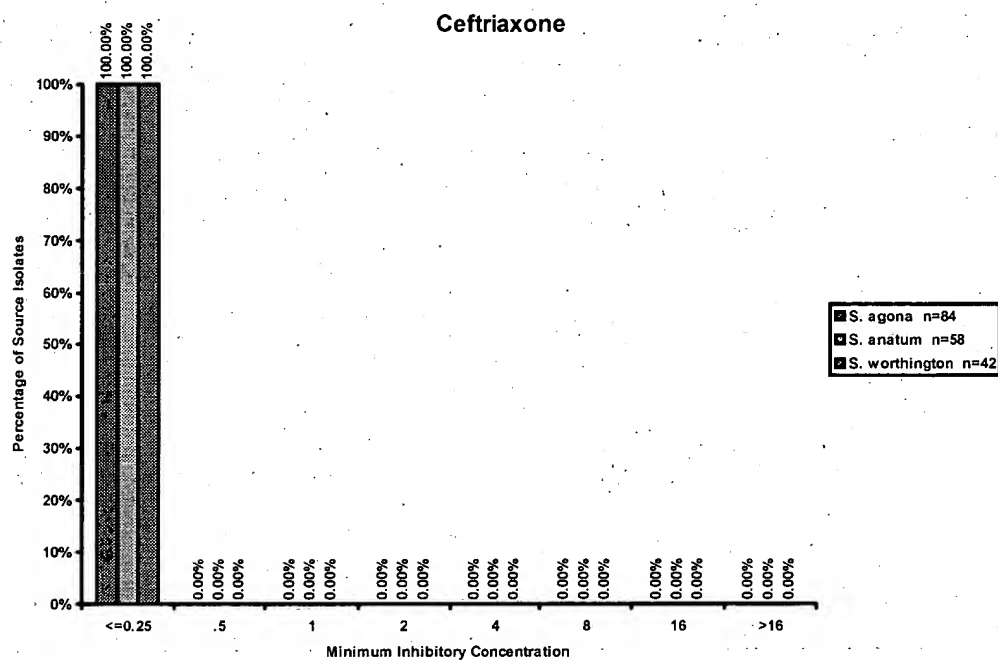


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

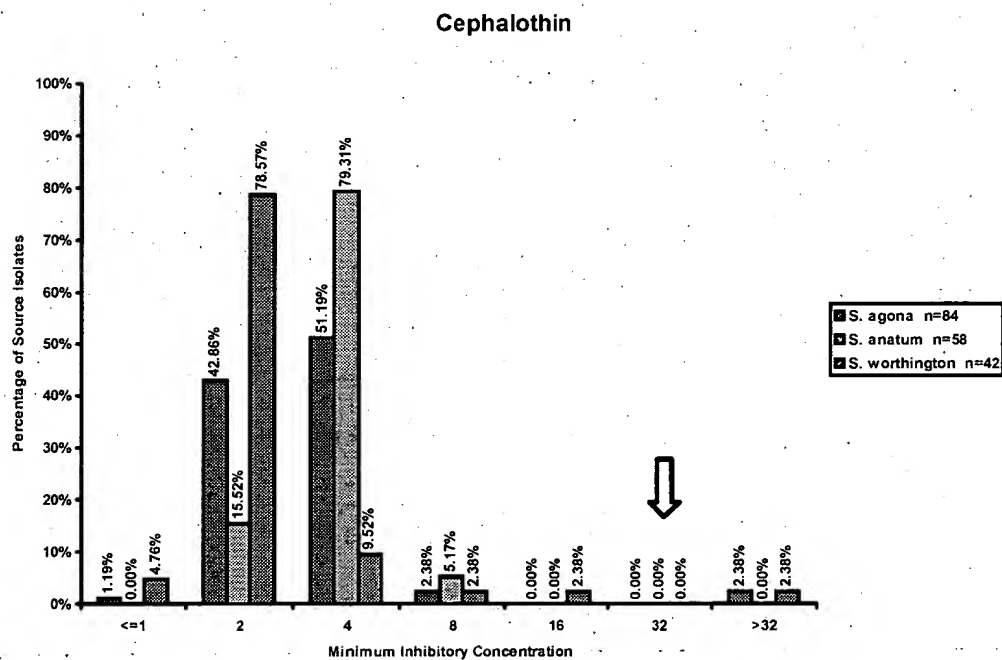


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

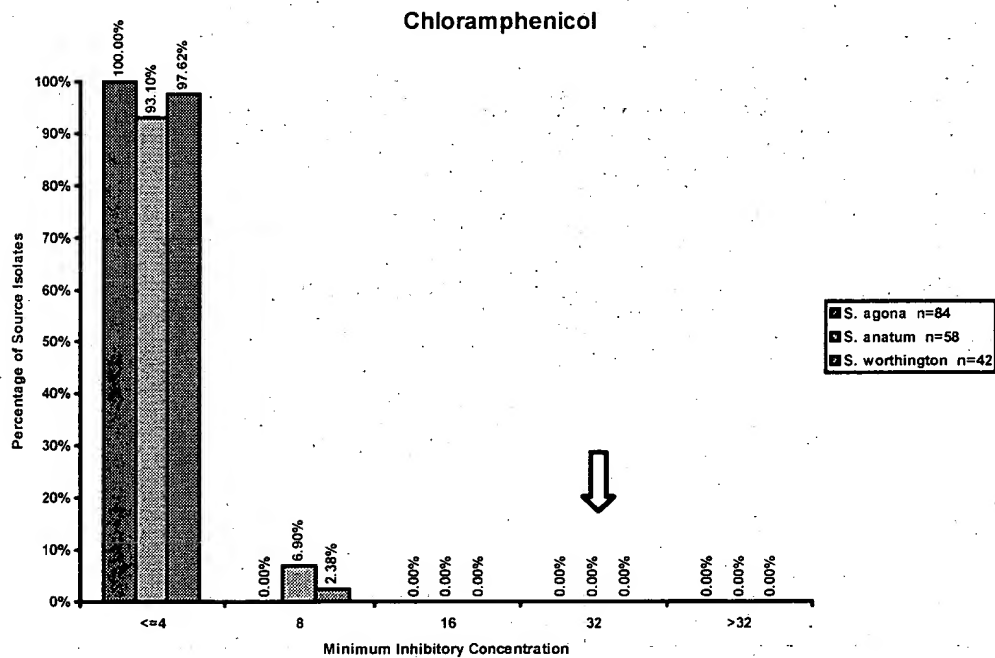


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

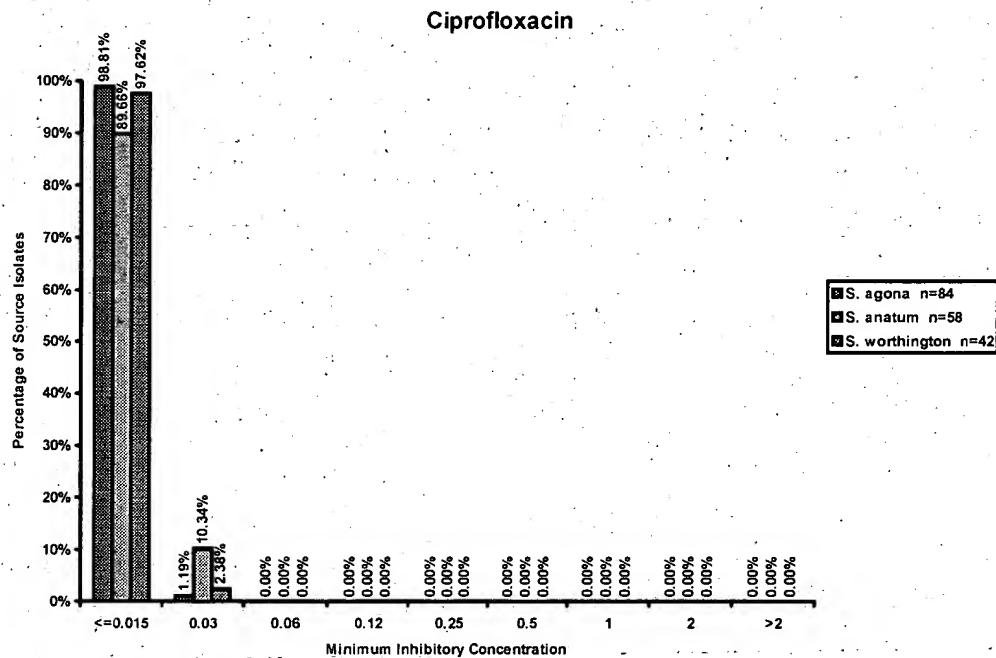


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

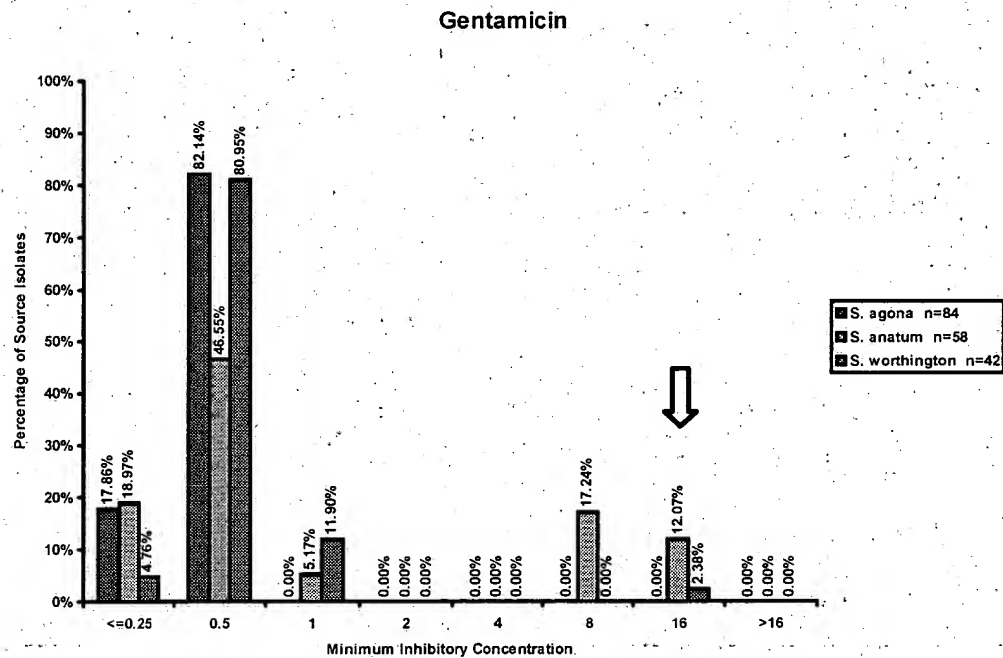


Breakpoint = 4

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

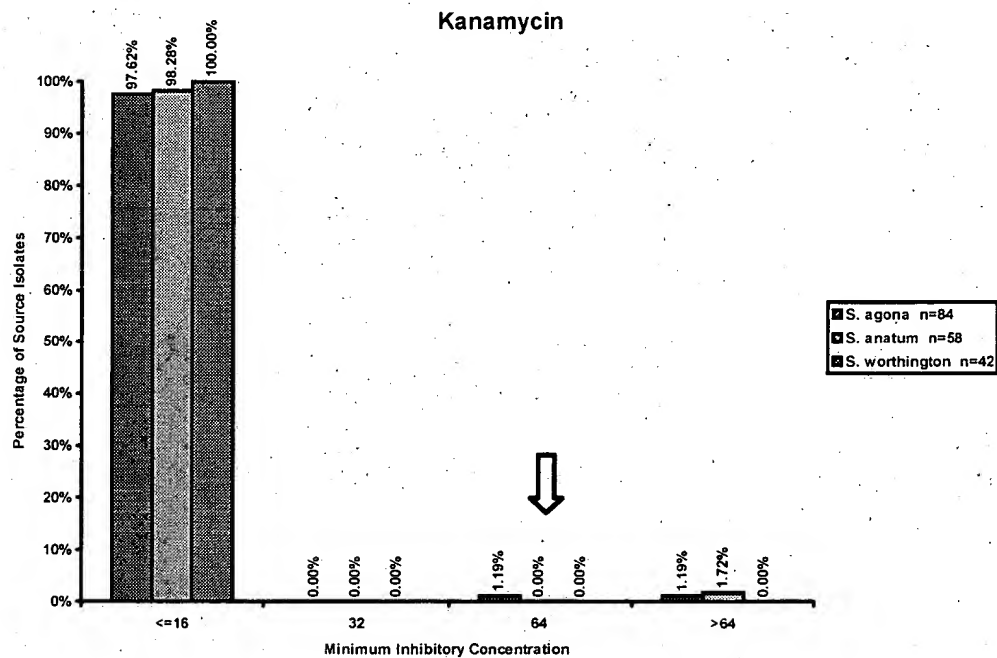


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

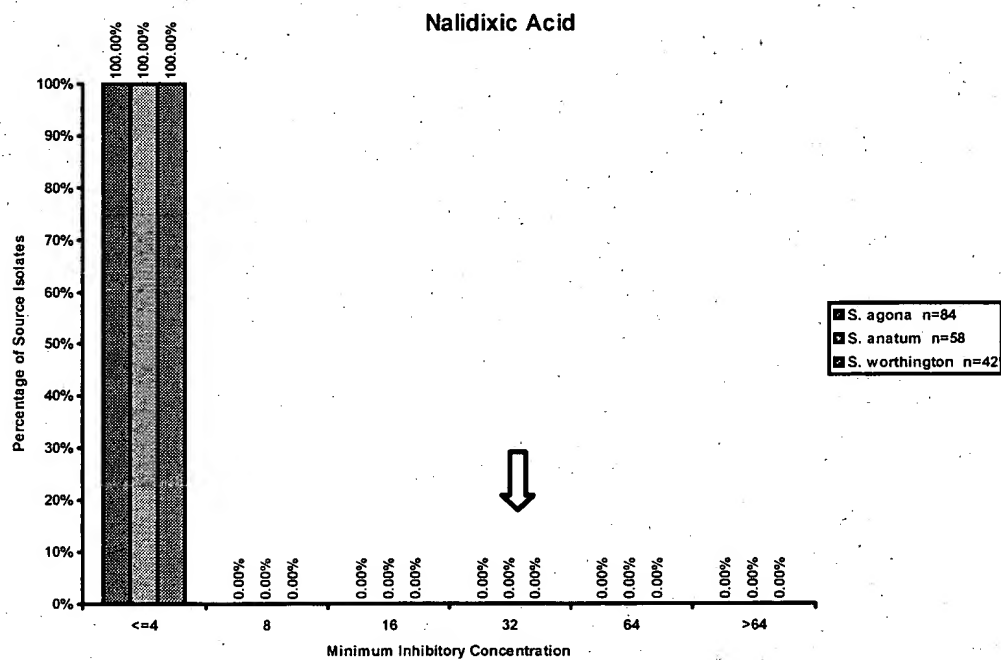


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

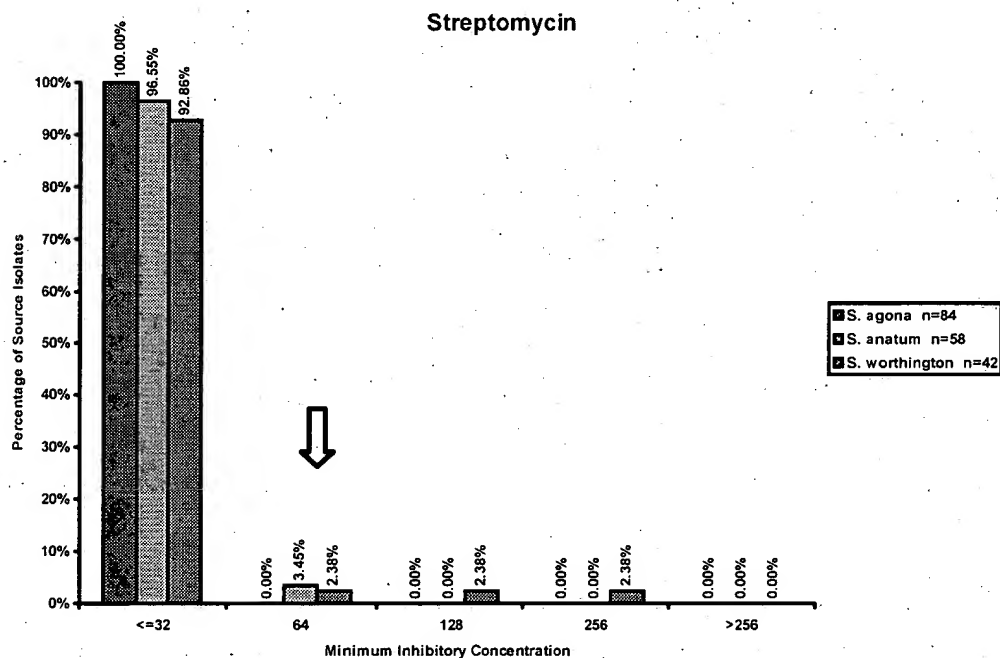
**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**



NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

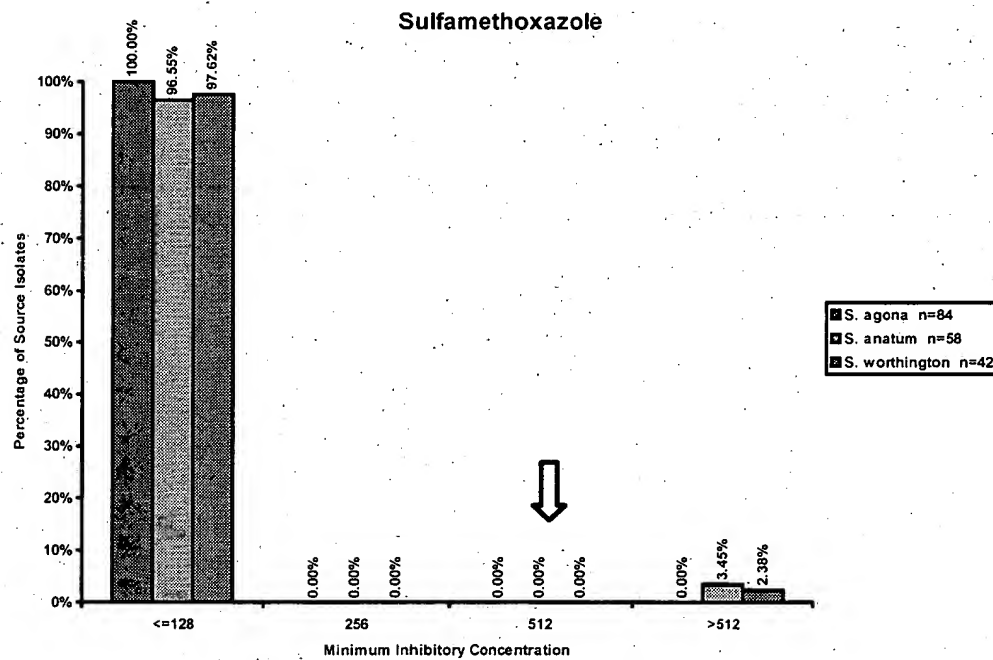


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

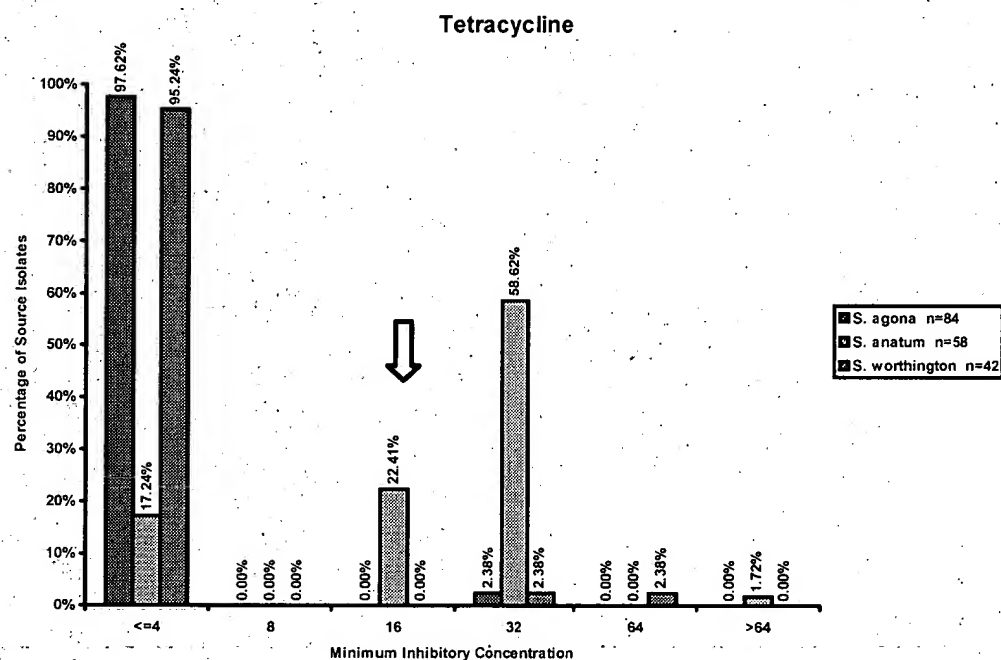


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

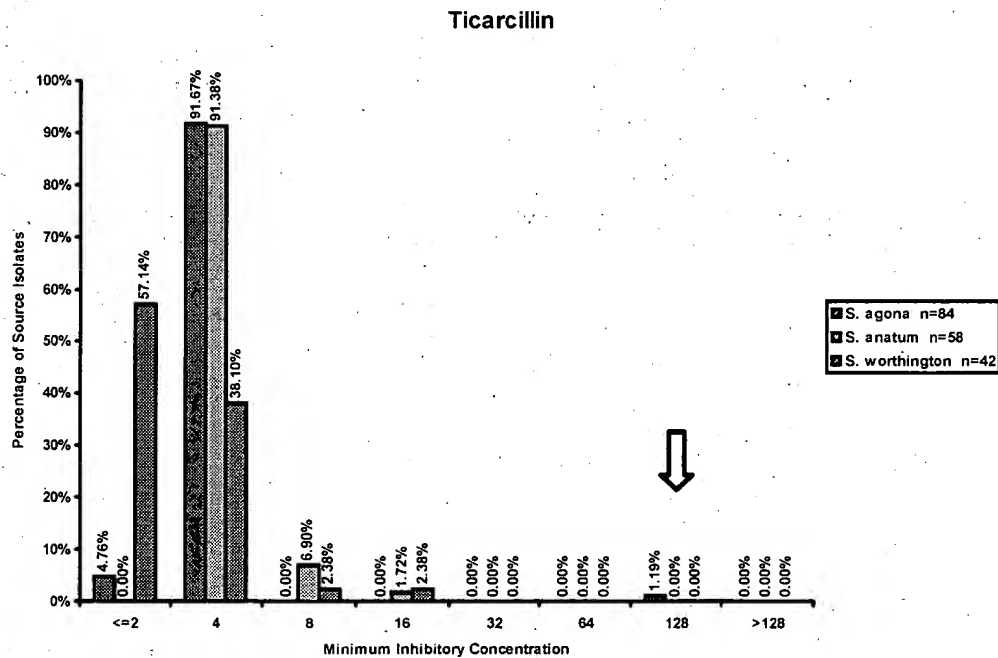


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

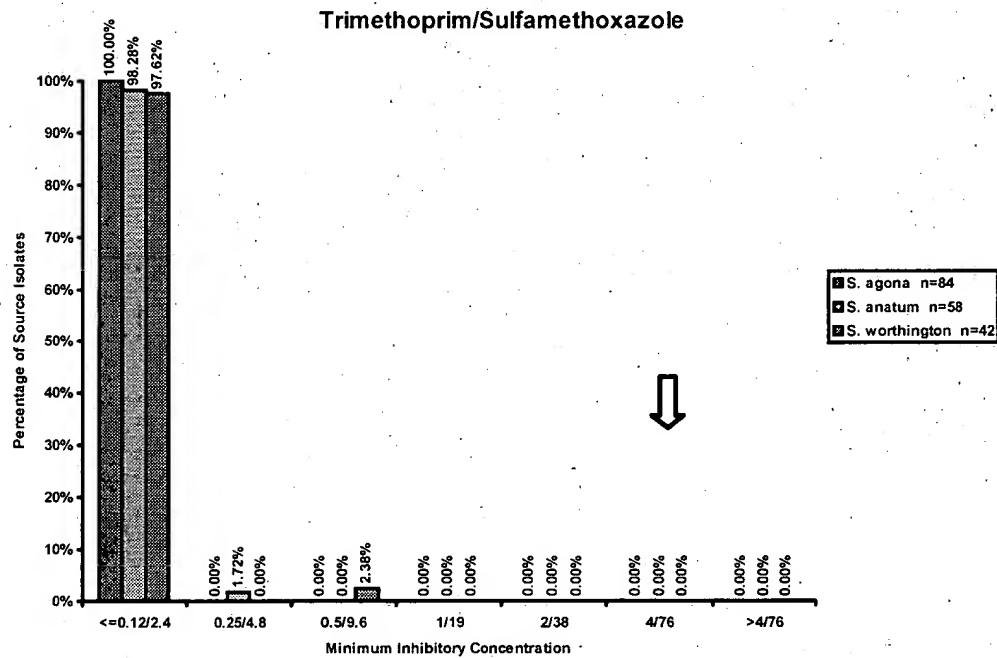


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 28. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Swine (Non-Clinical on Farm)**

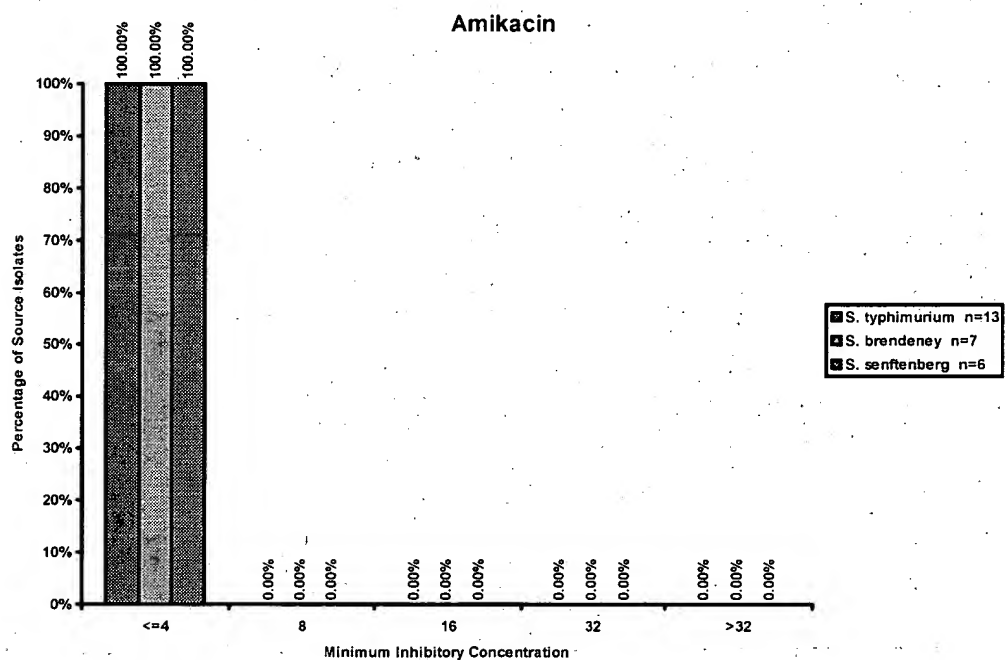


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

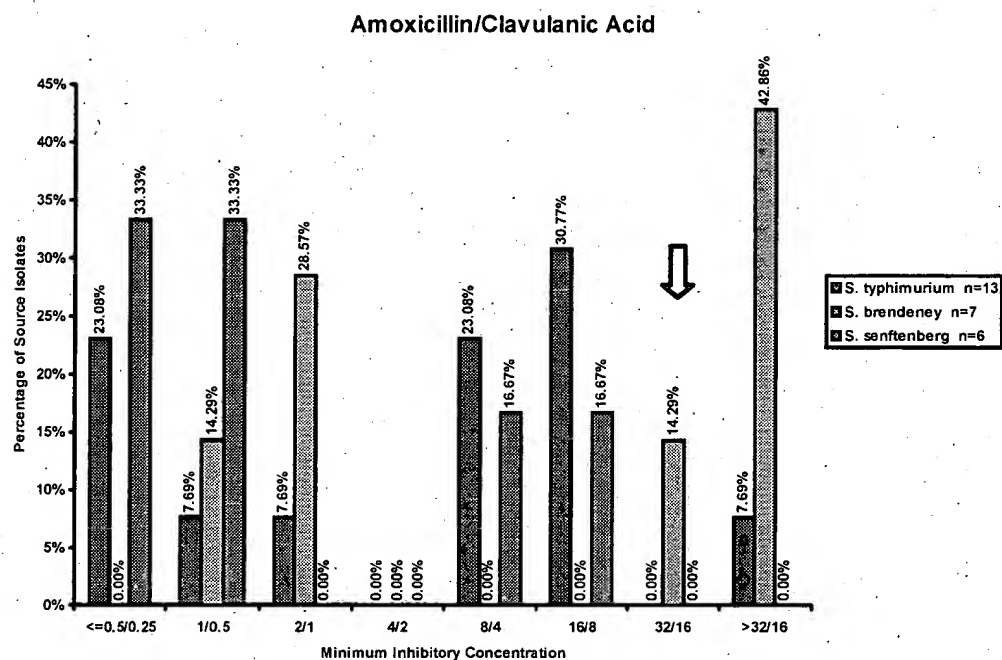


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

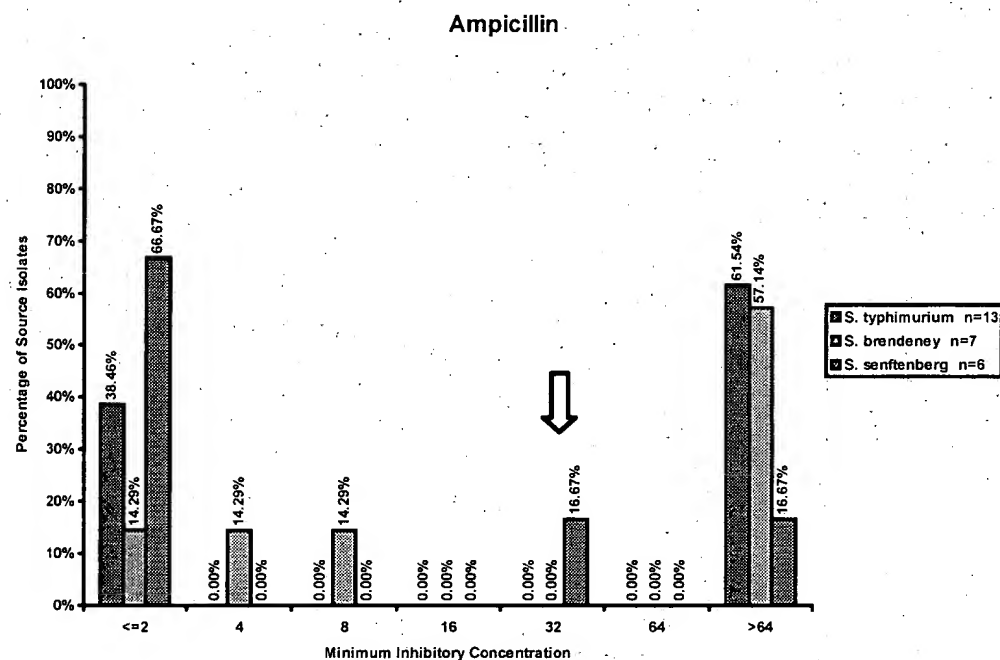


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

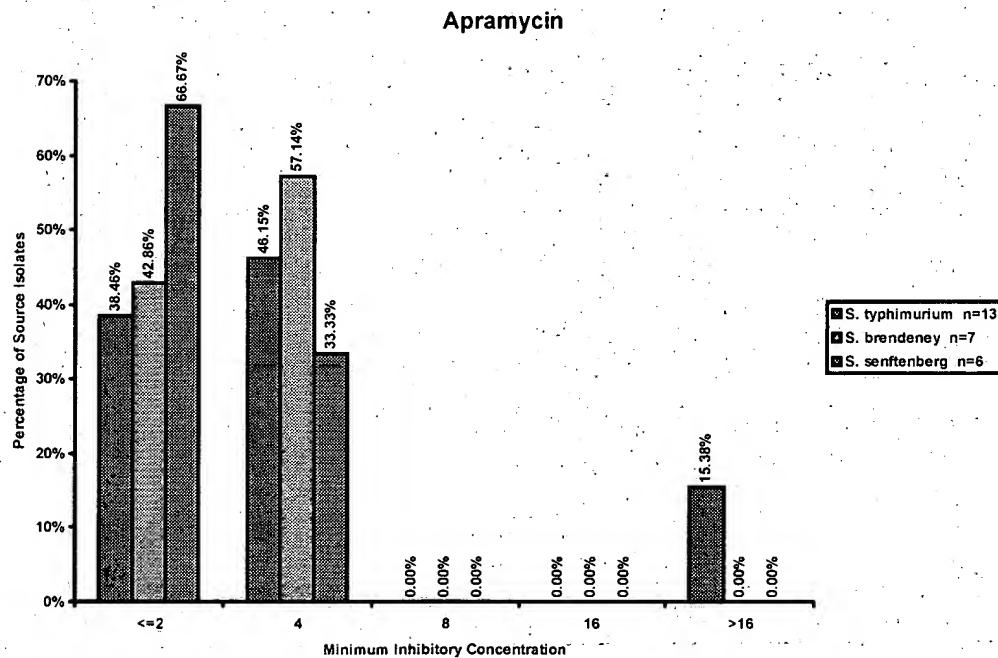


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

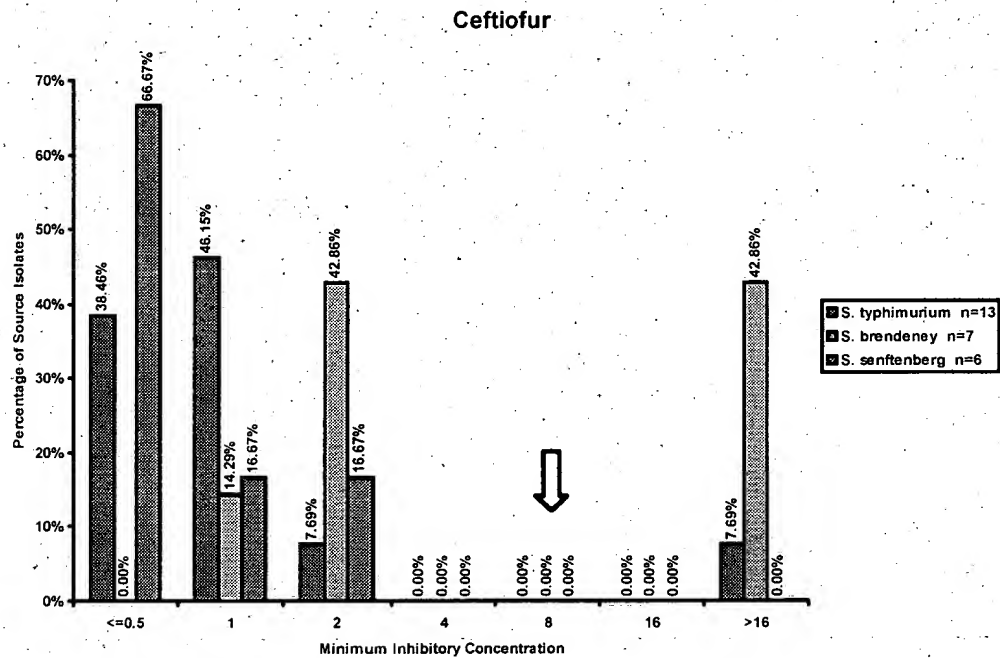


Breakpoint = 32

NARMS - EB 1997

Veterinary Isolates

Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent - Major Serotypes from Turkey (Diagnostic)

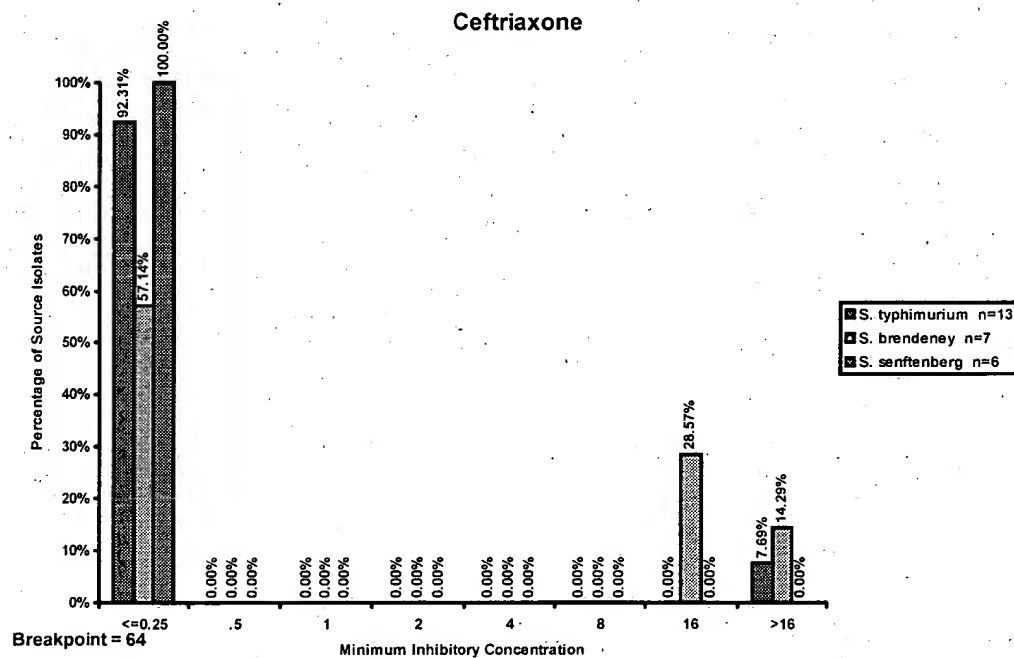


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

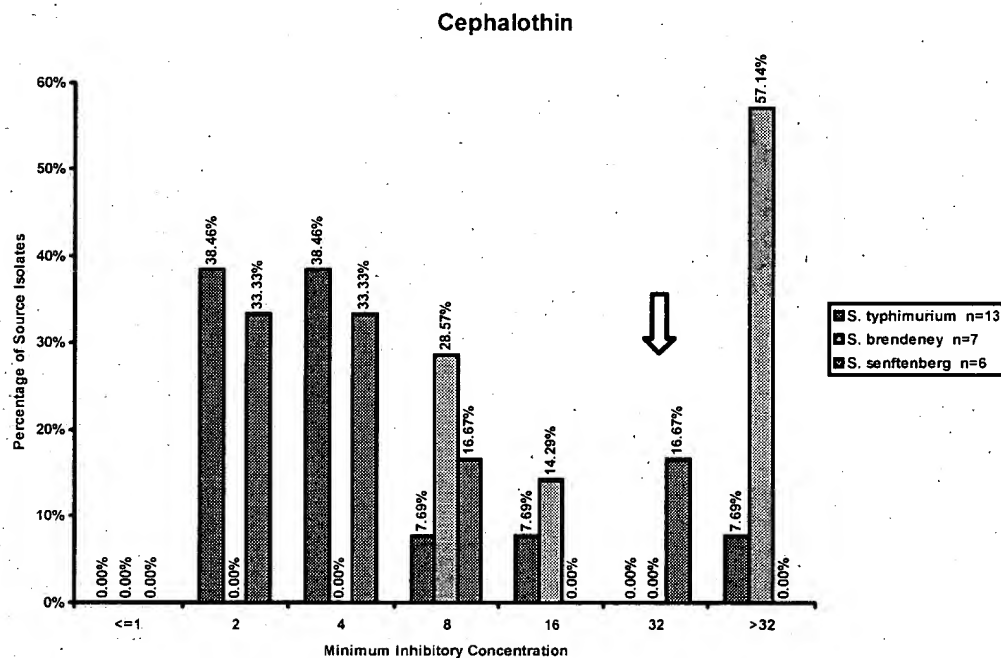


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

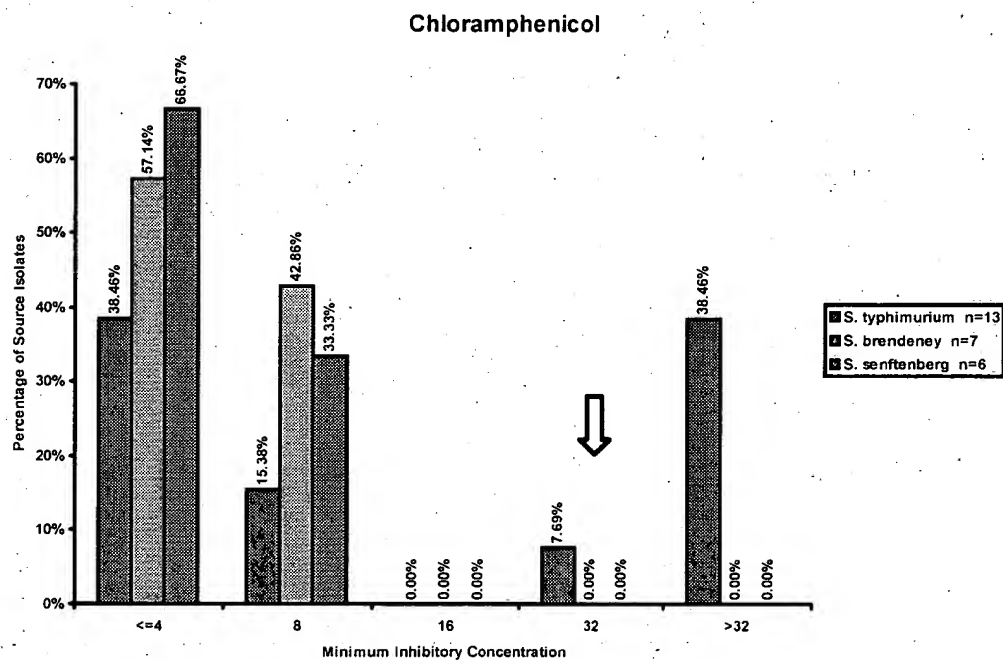


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

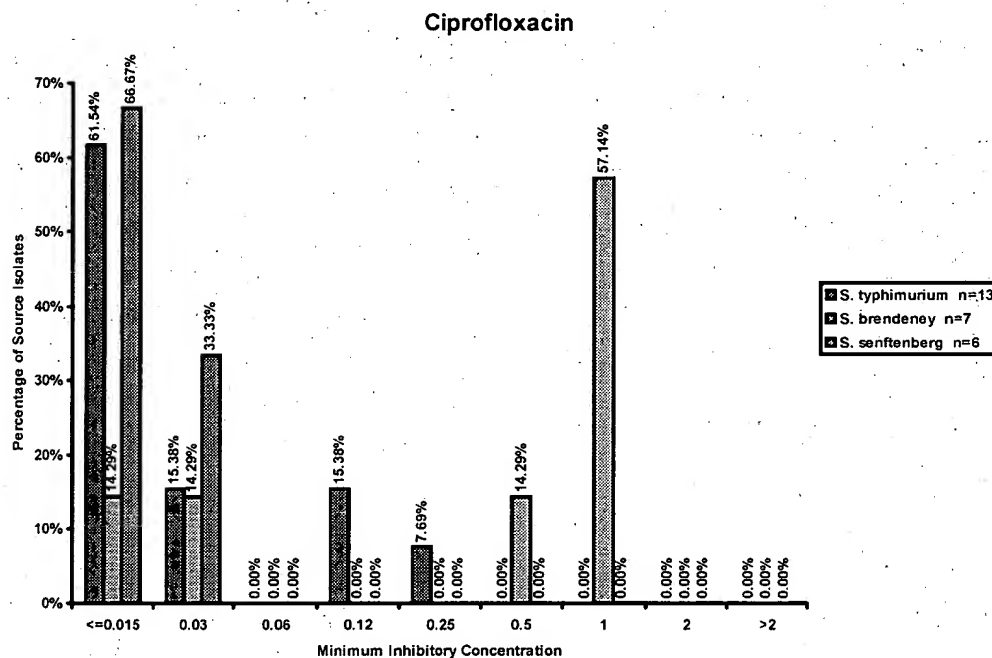


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

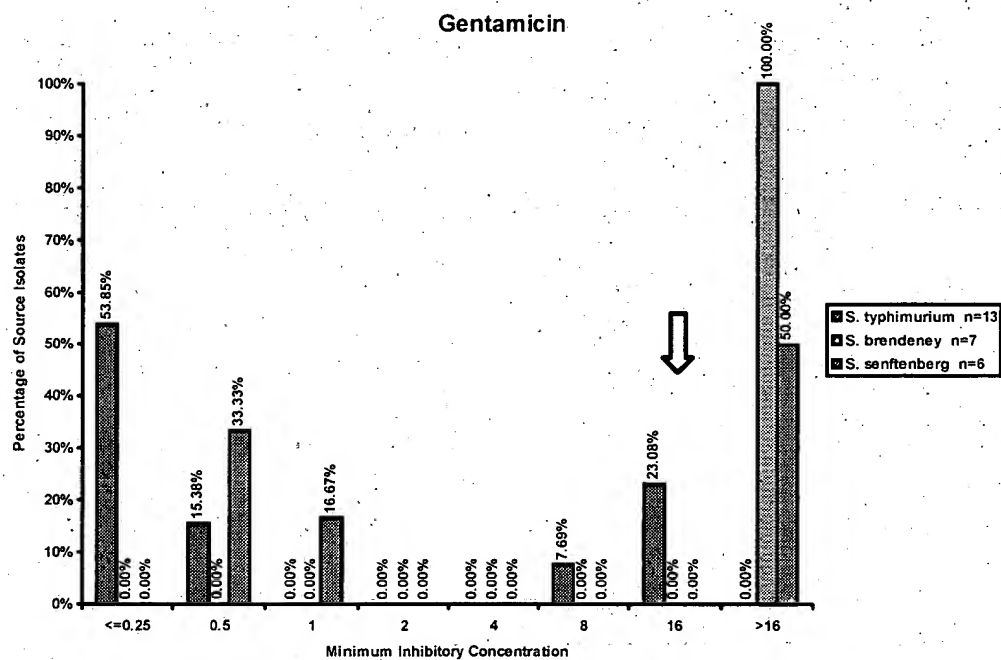


Breakpoint = 4

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

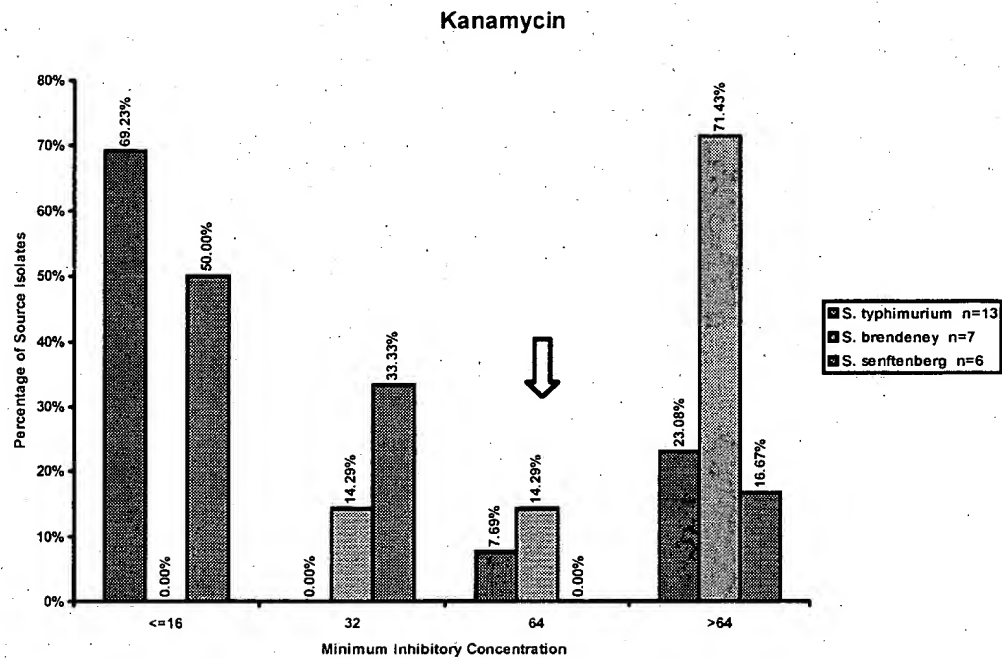


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

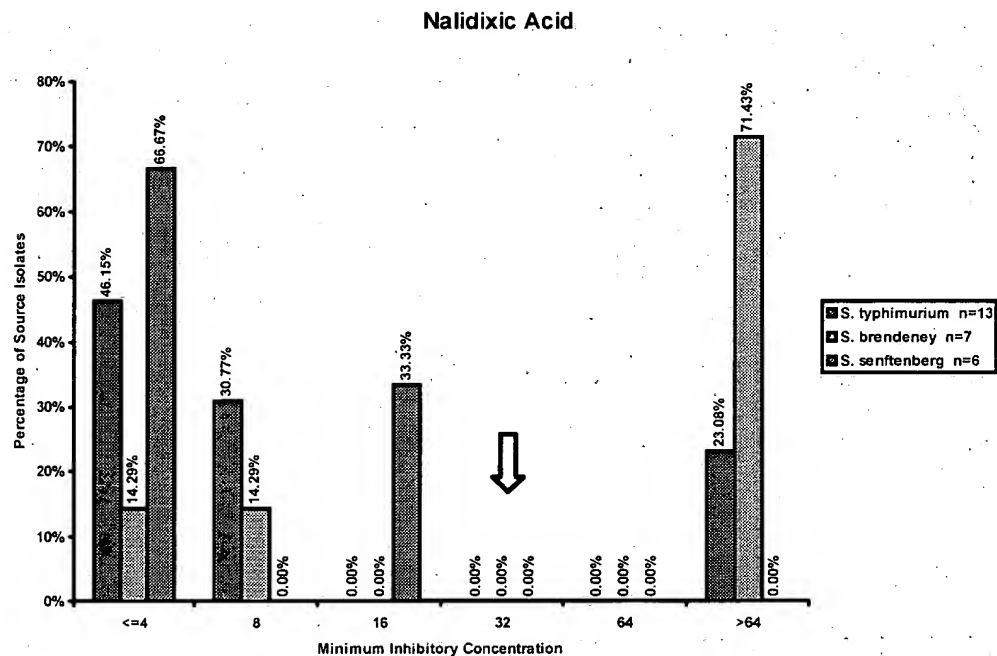


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

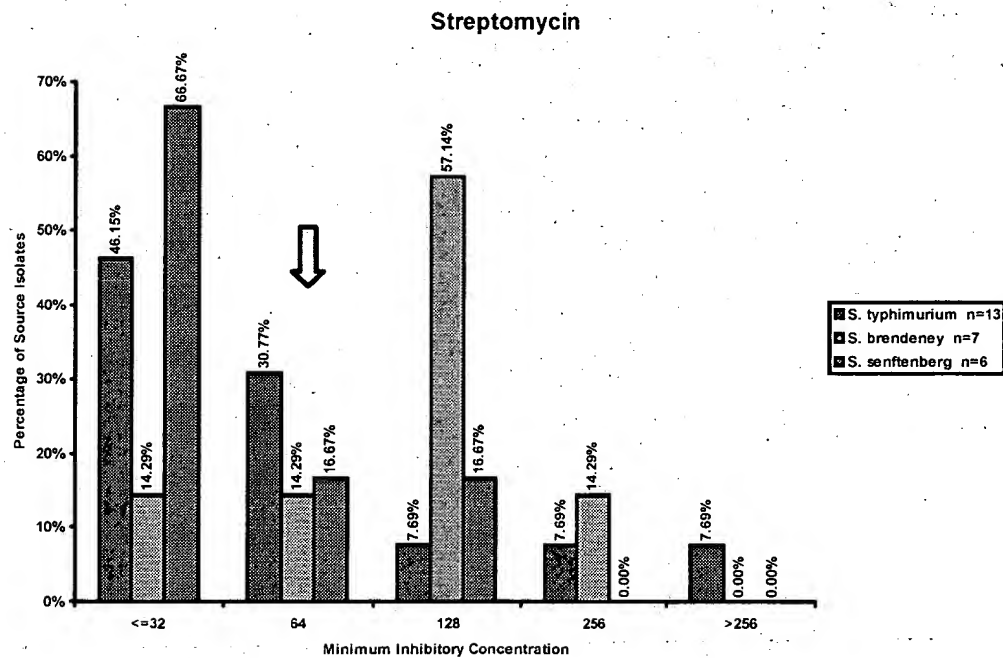


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

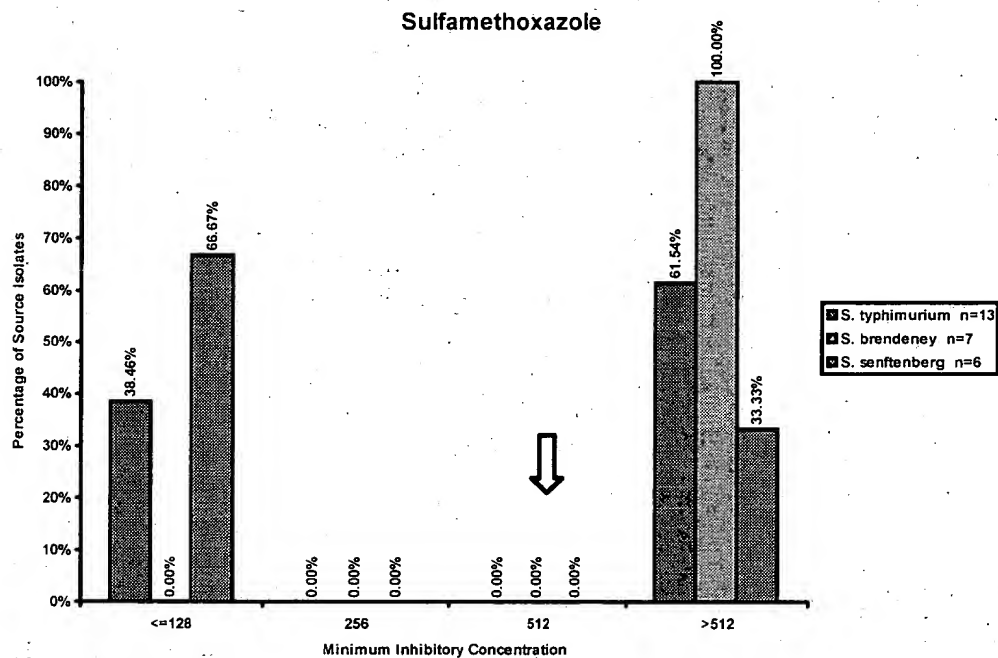


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

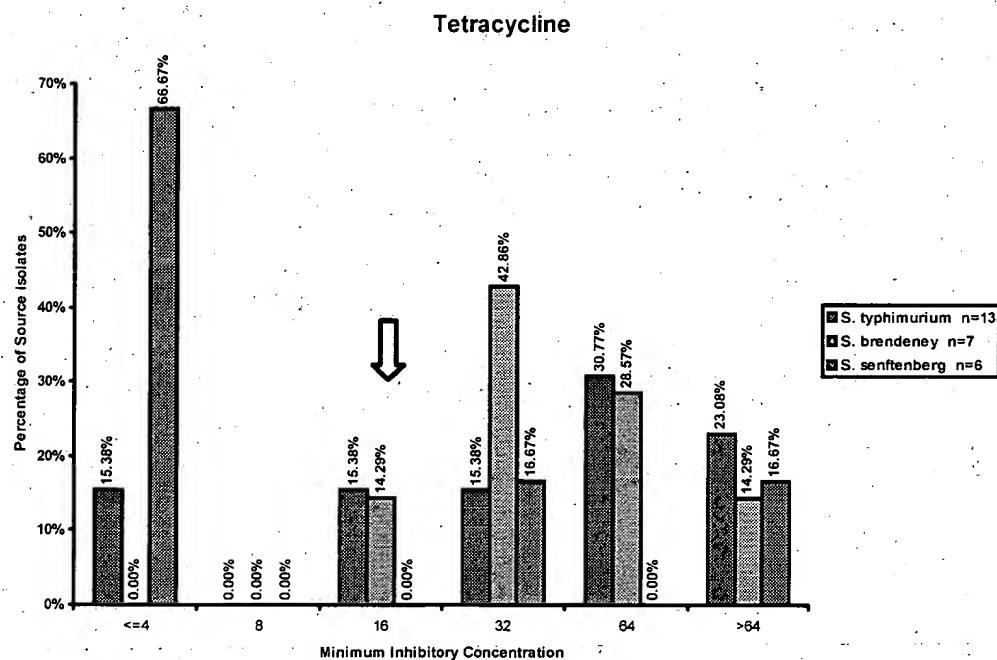


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

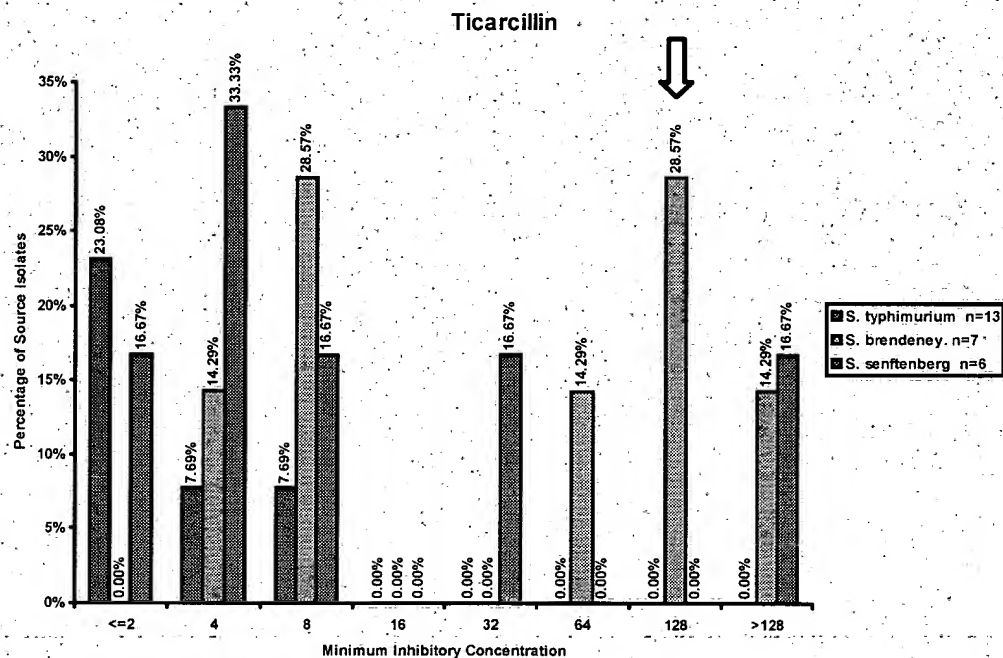


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

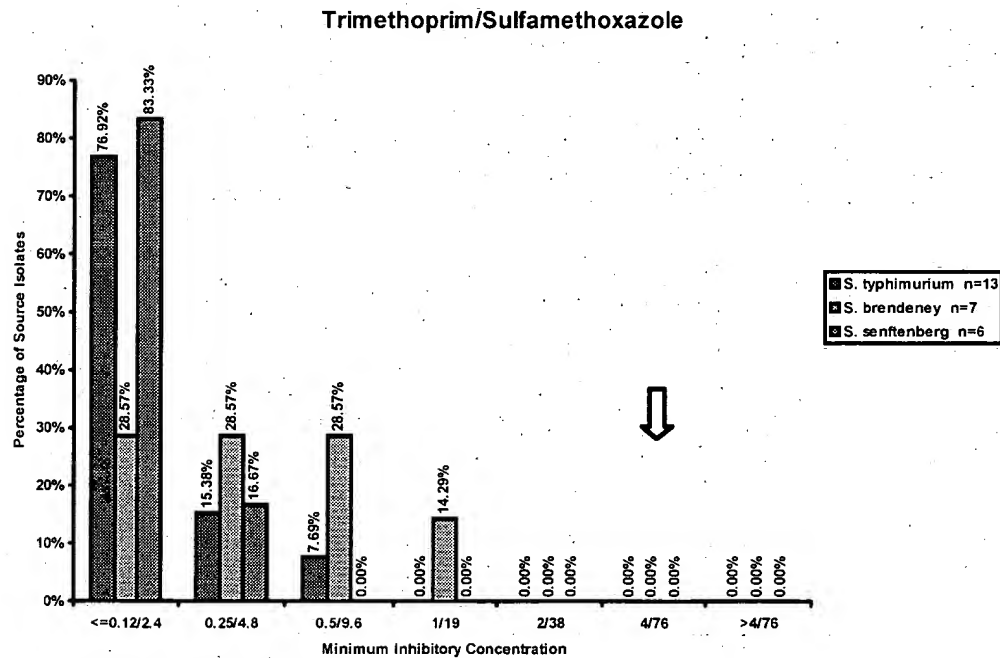


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 29. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Diagnostic)**

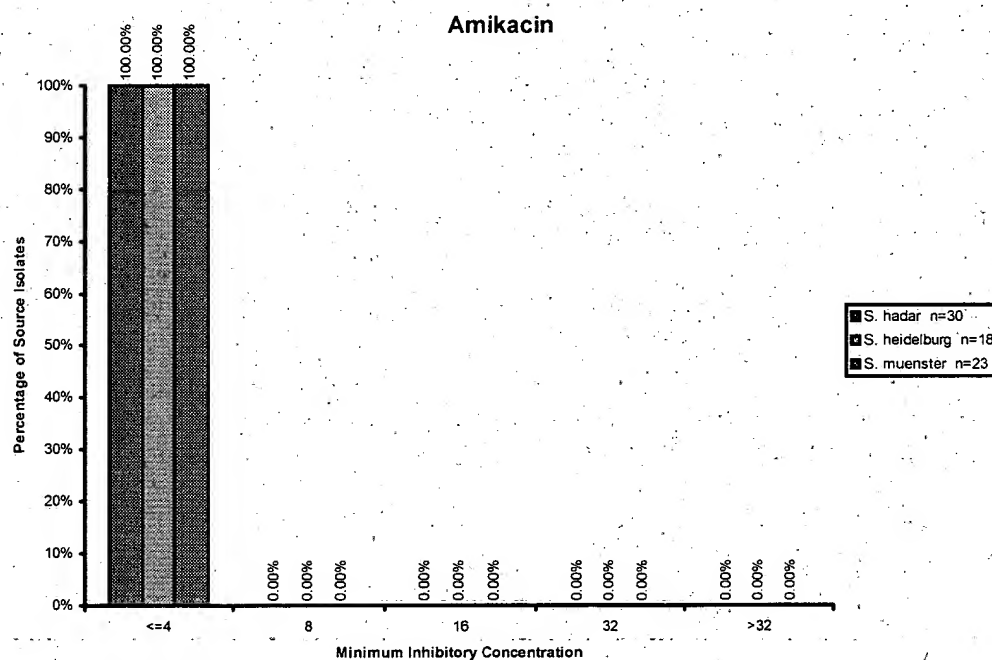


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

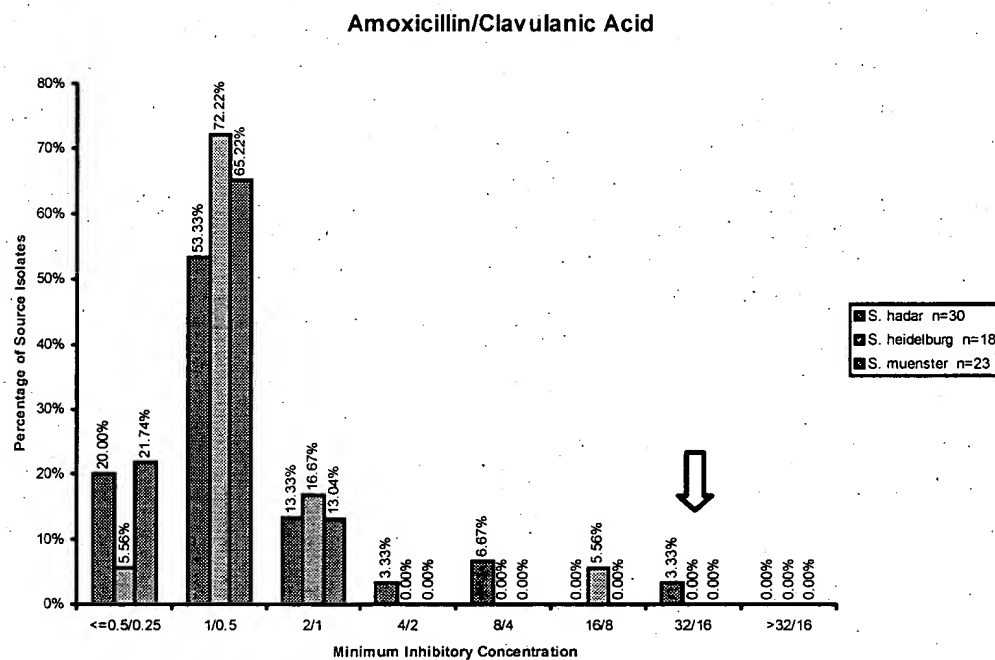


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

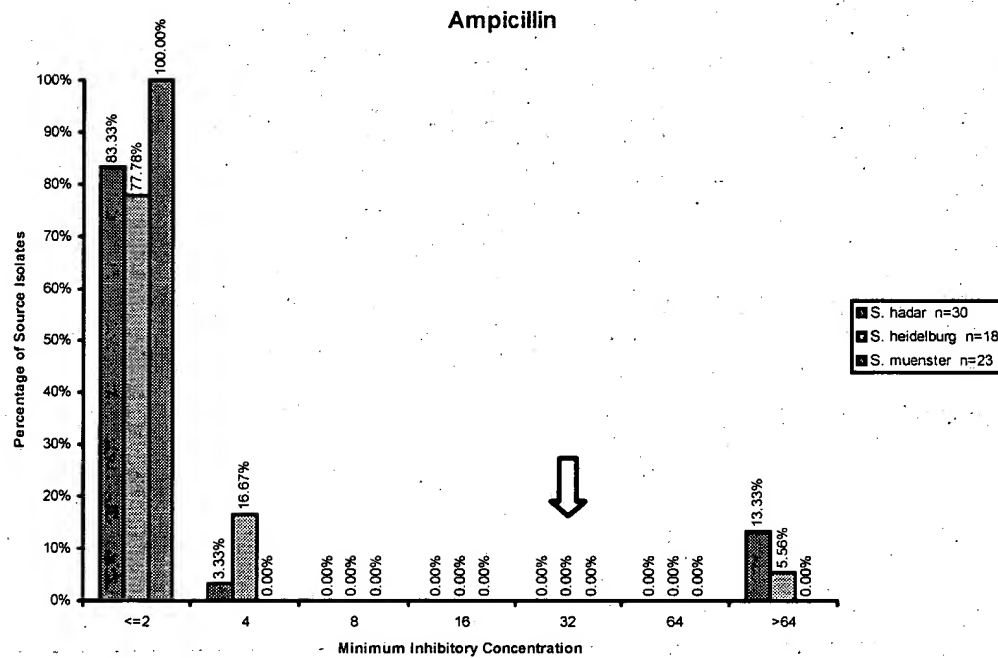


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

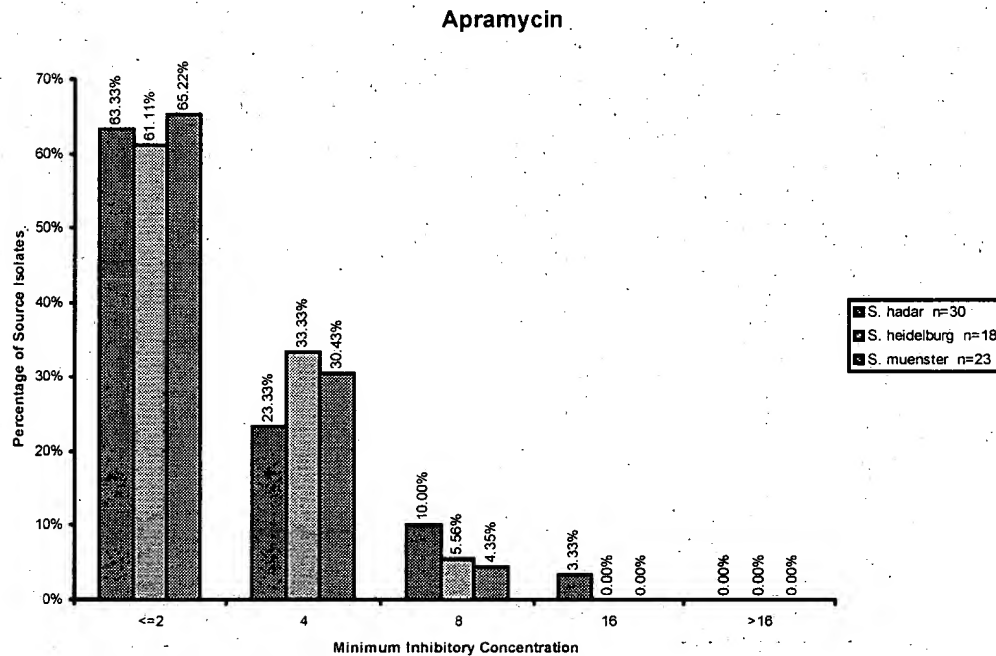


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

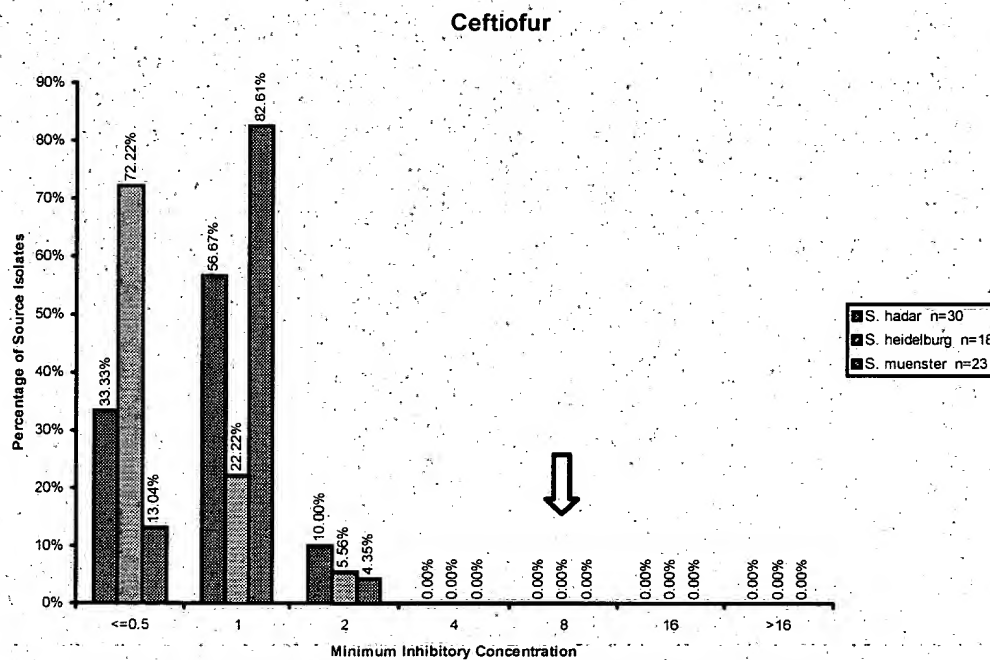


Breakpoint = 32

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

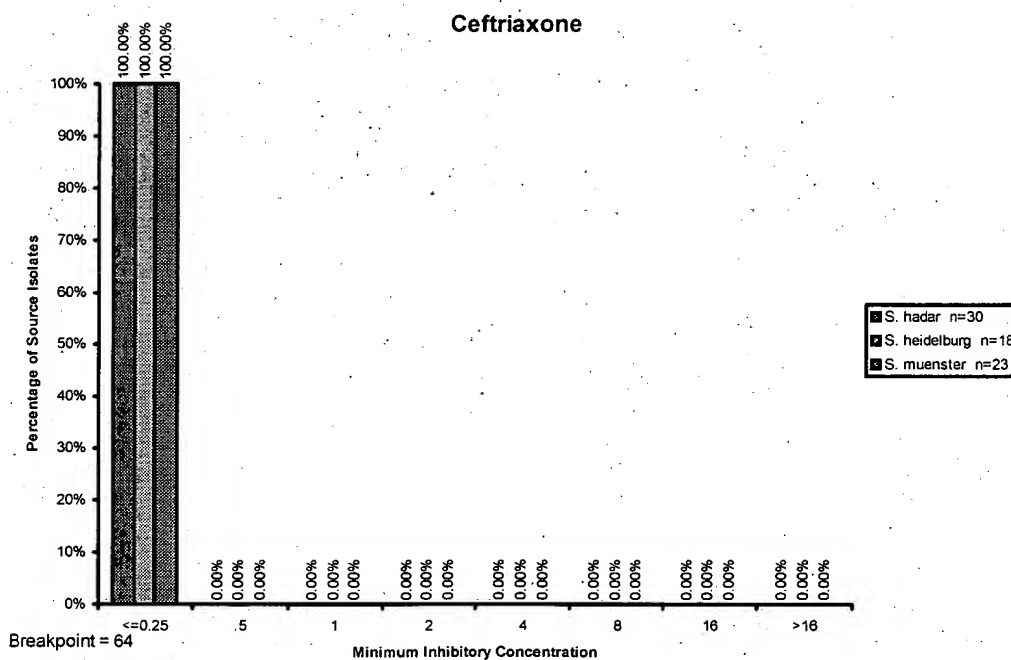


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

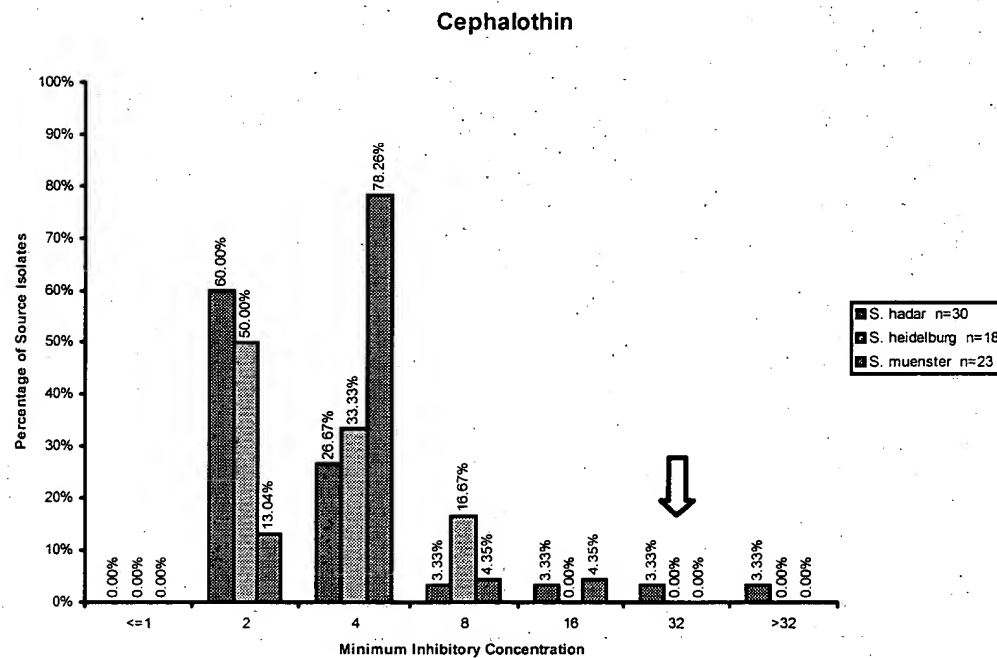


Breakpoint = 64

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

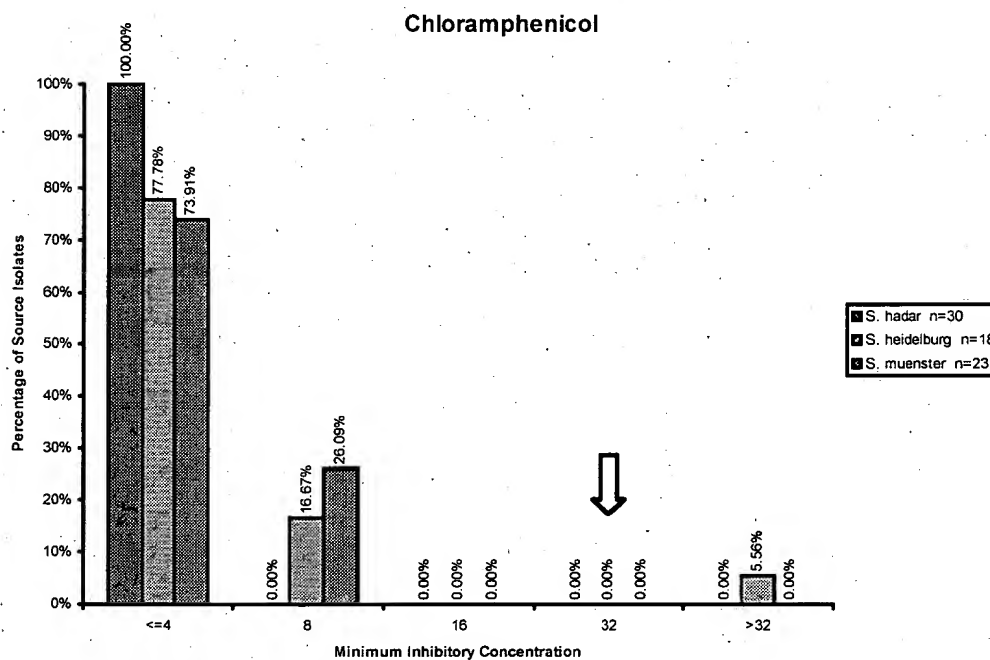


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

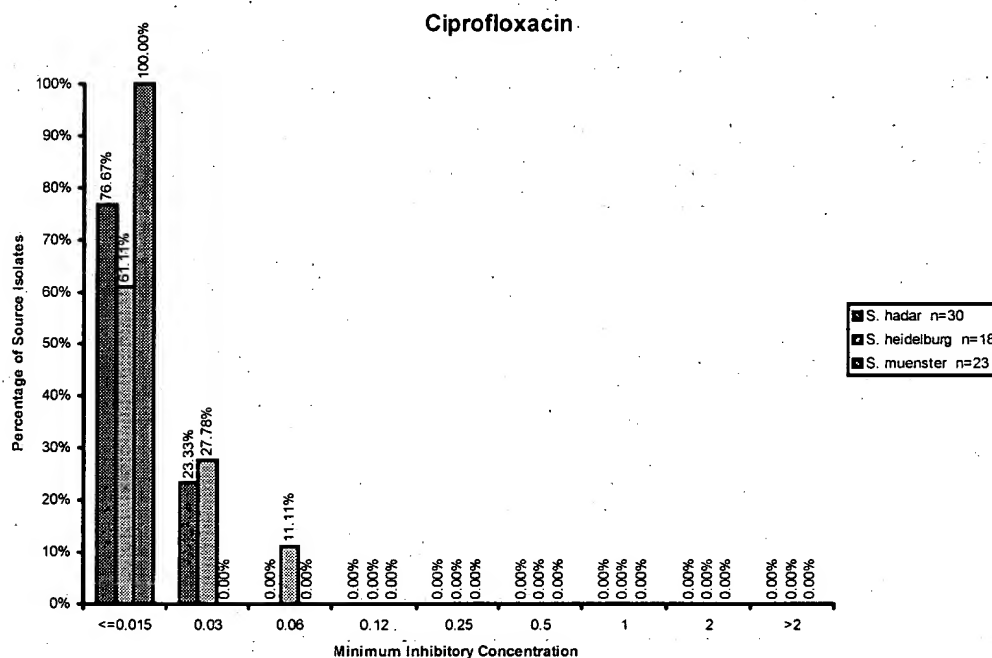


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

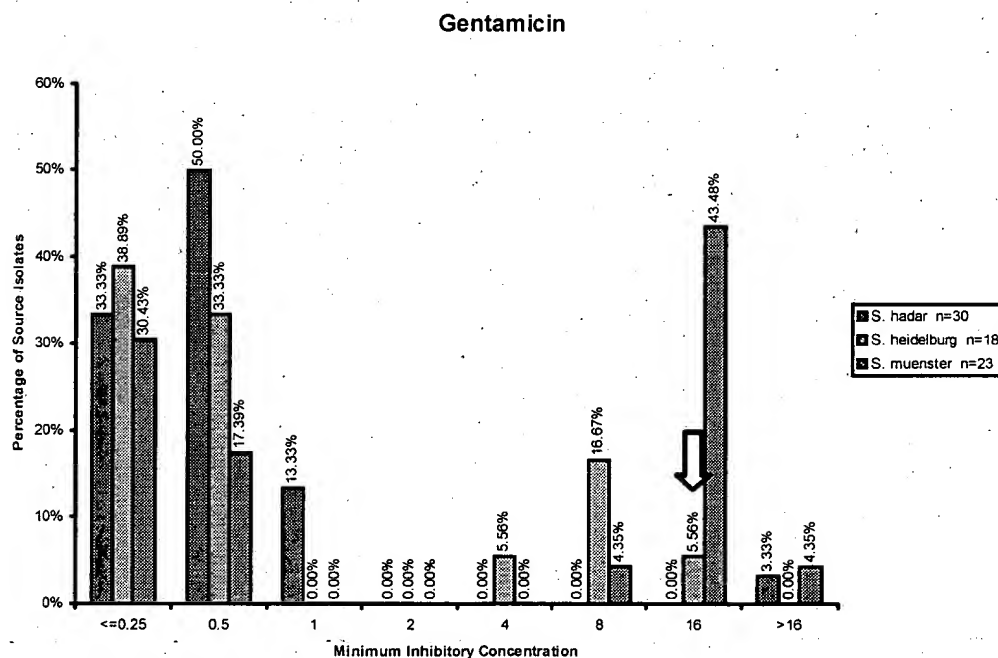


Breakpoint = 4

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

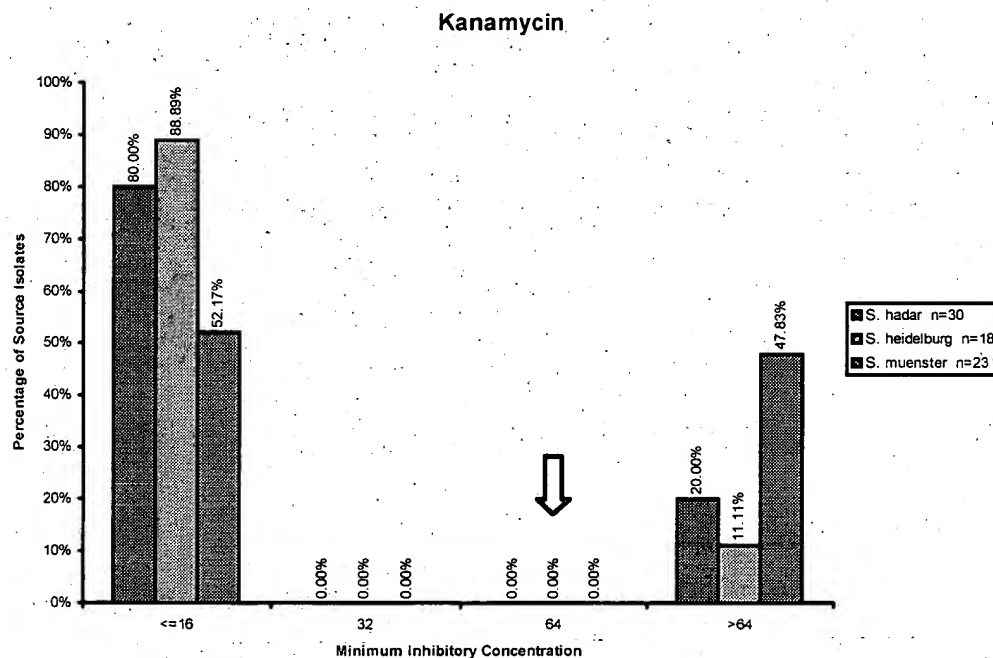


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

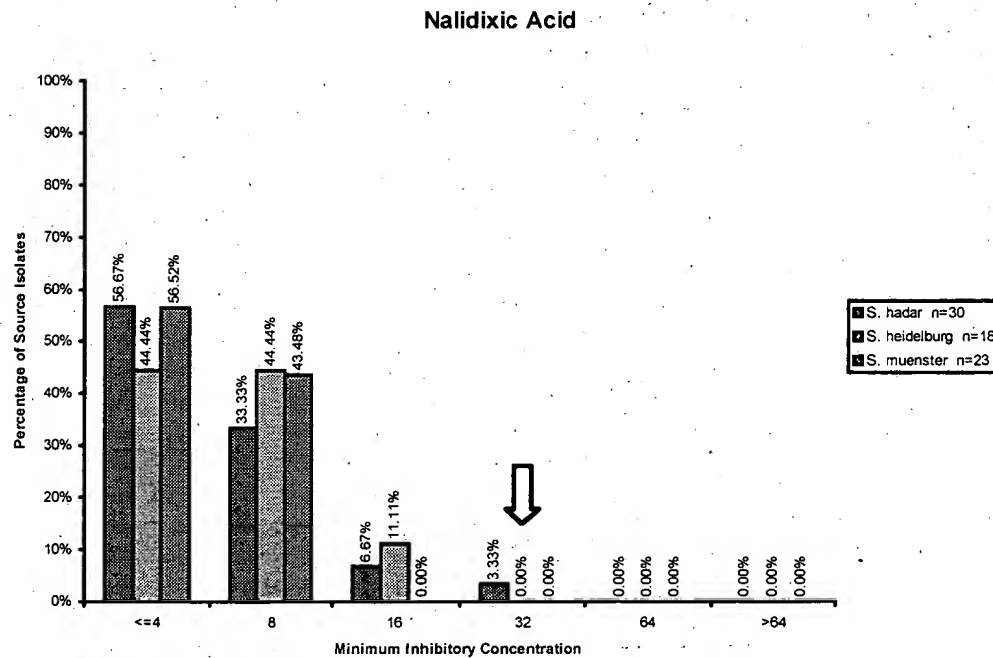


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

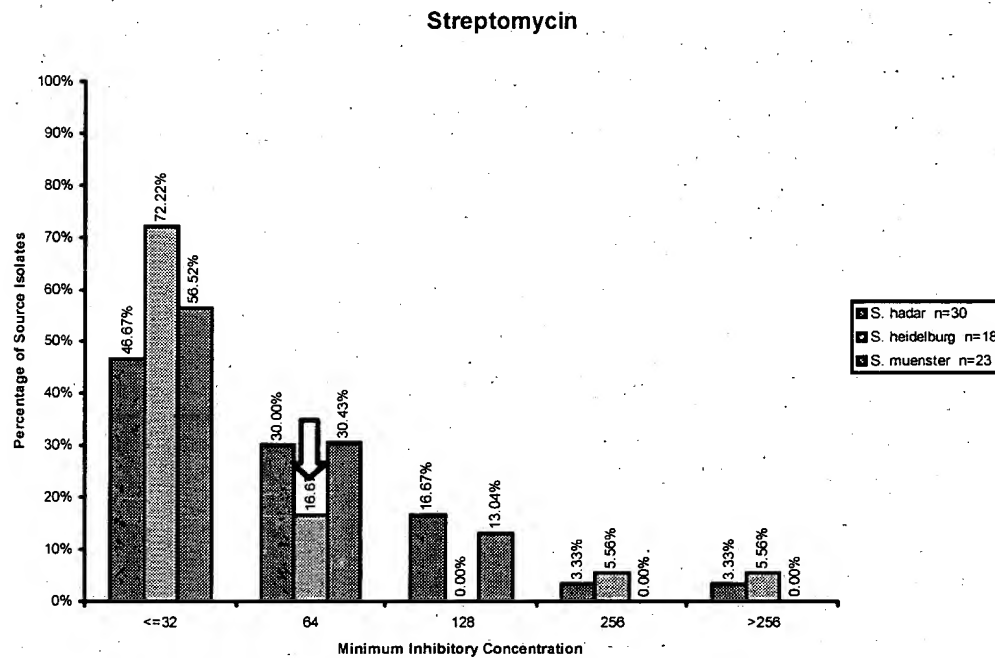


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

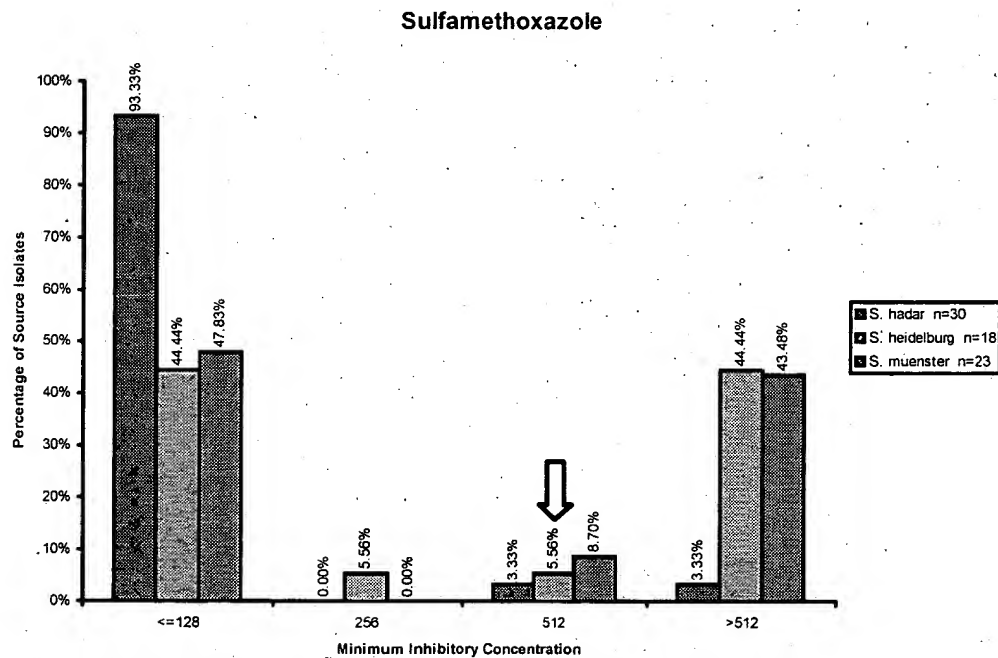


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

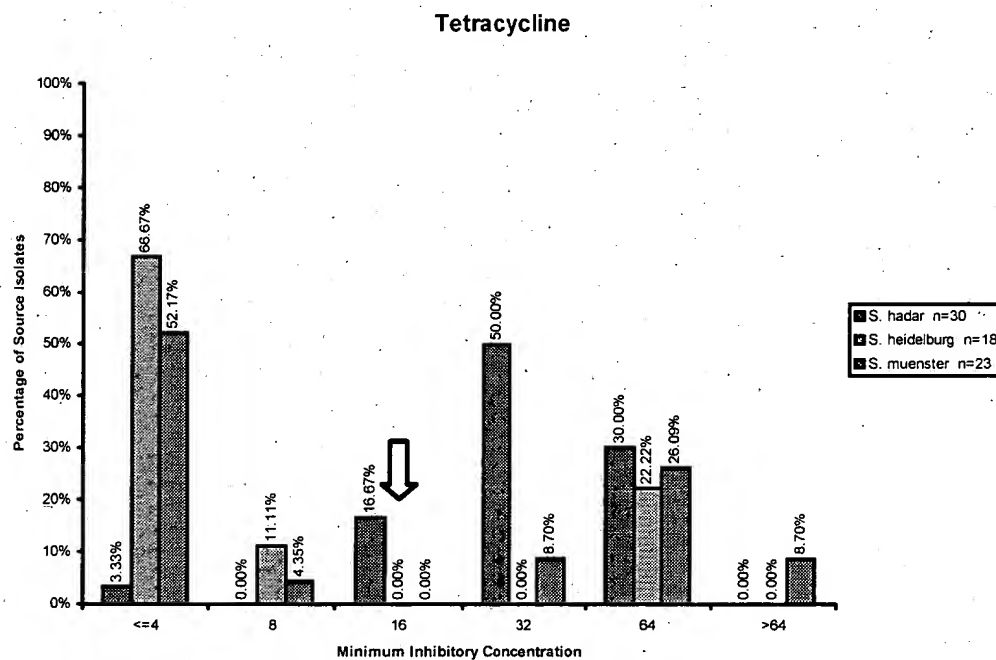


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

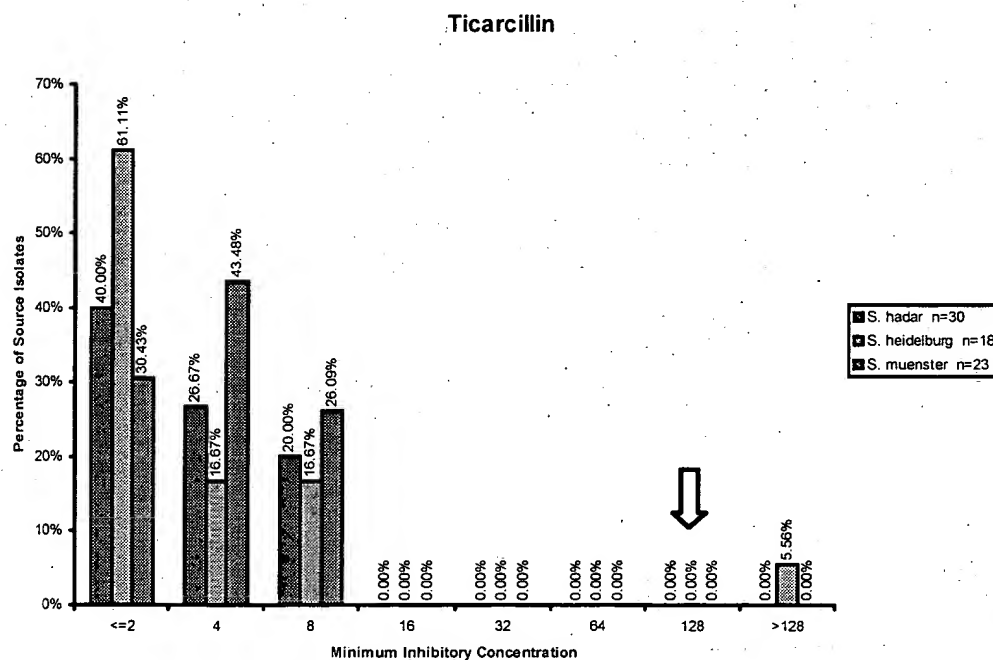


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**

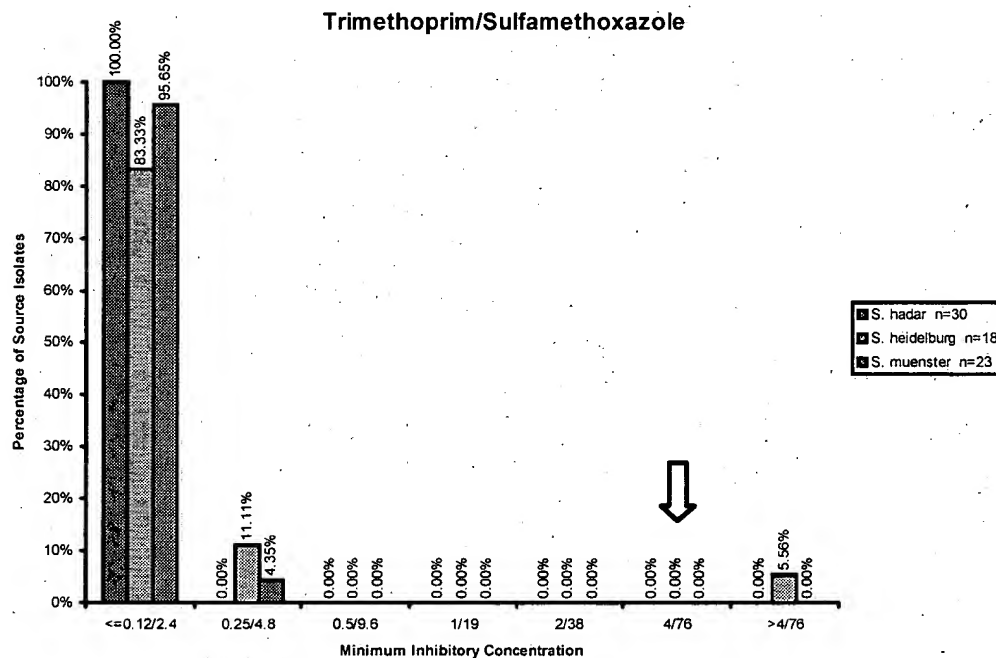


↓ Breakpoint

NARMS - EB 1997

Veterinary Isolates

**Fig. 30. Minimum Inhibitory Concentrations by Antimicrobial Agent
Major Serotypes from Turkey (Slaughter)**



↓ Breakpoint